Imaging and Geospatial Technologies –
Into The Future

ASPRS ANNUAL CONFERENCE
March 19–23, 2012
Sacramento Convention Center
Sacramento, California

Preliminary Program
www.asprs.org/Annual-Conferences/Sacramento-2012

asprs

DISCOVER SACRAMENTO!

Often called "a snapshot of Wild West history in a modern, world-class city", **Sacramento, California** is a perfect destination for the **ASPRS 2012 Annual Conference** and a great destination to extend your stay and discover California!

Today's Sacramento is a convergence of cosmopolitan life and gold rush history. As the Capitol of California, it is the oldest city in the state, founded in 1839. That history and charm truly come alive when you visit Old Sacramento. "Old Sac" as it is referred to, is a historic area of Sacramento located along the Sacramento riverfront, a short distance from the conference headquarters' hotel, the **Hyatt Regency Sacramento**. The city has a unique historic landmark district which looks much as it did in the 19th century, with wooden store fronts, shops and the occasional horse-drawn wagon. Here you will find restaurants, shopping, Gold Rush history and even the Transcontinental Railroad. All conference events will be taking place at the **Sacramento Convention Center**, adjacent to the conference host hotel. **See you at the 2012 Annual Conference, March 19-23**! More details can be found on the conference website at www.asprs.org/Annual-Conferences/Sacramento-2012.

THINGS TO DO AND SEE IN SACRAMENTO!

A First Stop for Planning and Information

The Sacramento Convention & Visitors Bureau: Ready to help plan your visit, the Visitors Center is located in the heart of the Old Sacramento historic district. Staff can personally assist you with trip planning, dining reservations, provide visitor guides, and brochures and information from all the attractions in the area. Make this your first stop while exploring Old Sacramento. Visitors Center Open daily, 10 am to 5 pm, 1002 2nd St. Old Sacramento, 916-442-7644.

Most items listed below are within walking distance of the conference hotel. The Aerospace Museum is approximately 12 miles north-east of downtown and will require transportation.

Things to Do and See

Old Sacramento — A National Historic Landmark District located along the Sacramento River, established in 1849. Shopping, dining, entertainment and world-renowned museums set within the California Gold Rush and the Transcontinental Railroad. To get to Old Sacramento from the conference hotel, walk about a mile westward down the K Street Mall towards the Sacramento River.

Laughs Unlimited — It's been a long day and you want to unwind and laugh until your jaw cramps. This is the place to disappear to along with friends having the same sense of humor. Drinks and food served table side while the act goes on. 1207 Front St. (916) 446-8128

The California State Railroad Museum — The world's most extensive collection of locomotives and rolling stock that opened up the West. Walk amongst giants; tour the inside of a 1950's passenger car complete with sleepers. Climb up into the cab of a steam engine imagine what it took to pull a mile long line of cars up and over the Sierra Nevada. 111 I St. (916) 323-9280

California Aerospace Museum — Get up close to a Russian MIG-17 with red stars-and-bars of the aggressor force of Top-Gun (how, when and where the USAF obtained it remains classified). See an A-10 Warthog with kill markings from Desert Storm. If you appreciate aircraft, this museum should be in your bucket list. 3200 Freedom Park Drive, McClellan, (916) 643-3192. **You will need your own transportation.**

CITY OF SACRAMENTO
CALIFORNIA

OFFICE OF THE
MAYOR

KEVIN JOHNSON
MAYOR

March 19, 2012

Greetings!

On behalf of the City of Sacramento, I would like to extend a warm welcome to all of you attending the 2012 Annual Conference of the American Society for Photogrammetry and Remote Sensing. I am pleased the ASPRS has chosen Sacramento as the stage from which it can share with all of you, its premise of "Imaging and Geospatial Technologies – Into the Future." I am excited that you have this opportunity to help increase the understanding of geospatial information science, technology and applications, and their implications for future generations. I commend ASPRS for its contributions to the toolsets citizens throughout the world employ in their daily lives in understanding the world around them and in the decision-making required to flourish in it.

While you are visiting Sacramento, please visit the city's many attractions and experience the multitude of its rich cultural and historical traditions and diversity. Please accept my best wishes for a productive conference. I especially hope you have the opportunity to explore Sacramento and all it has to offer. But, above all, enjoy the conference.

Sincerely,

Kevin Johnson
MAYOR

CITY HALL - 5TH FLOOR
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PH 916-808-5300 • FAX 916-264-7680 Mayor@cityofsacramento.org

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Future ASPRS Conferences

2012 ASPRS/MAPPS Fall Specialty Conference
Marriott Tampa Waterside Hotel
Tampa, Florida
October 29 - November 1, 2012

ASPRS 2013 Annual Conference
Baltimore Marriott Waterfront Hotel
Baltimore, Maryland
March 24-28, 2013

ASPRS 2013 Falll Conference
Crowne Plaza San Antonio Riverwalk
San Antonio, Texas
October 29-31, 2013

ASPRS 2014 Annual Conference
Galt House Hotel
Louisville, Kentucky
March 23-27, 2014

ASPRS 2015 Annual Conference
Tampa Bay Marriott Waterside Hotel
Tampa, Florida
May 4-8, 2015

Imaging and Geospatial Technologies – Into The Future

We take immense pleasure in inviting you to the Annual Conference of the American Society for Photogrammetry and Remote Sensing (ASPRS) in Sacramento California, March 19-23, 2012. In 2006, in Reno Nevada, the Intermountain and Northern California Regions joined forces to co-host a successful annual conference. We have teamed up once again and are proud to be able to share the honor of hosting the 2012 conference. As you can see from the preliminary program, our conference organizers have assembled an exciting array of workshops, papers, and exhibits to take you on an exploratory journey of **"Imaging and Geospatial Technologies – Into the Future".**

Dr. David Thau, Senior Developer Advocate with Google Earth Engine, has agreed to be a keynote speaker. We live in an age of massive image datasets; prodigious spatially (e.g., global), temporally (e.g., spanning decades), and physically (e.g., consuming petabytes of storage). The ability to store, manage, and process these data has typically been the domain of large institutions. Happily, tools to create, access, and process large image datasets are becoming increasingly available to the general public. Dr. Thau's presentation — **"Terapixels for Everyone: Life in the Age of Massive Image Datasets"** — will survey recent advances in the democratization of large image datasets, discussing technical challenges, and highlighting the qualitatively different types of analyses that are possible when individuals have terapixels at their fingertips. We are also pleased that Dr. Kenneth Hudnut, U.S. Geological Survey, and Southern California Coordinator for the Earthquake Hazards Program, will serve as a keynote speaker. His address, **"A Geospatial Ultimatum for the Future: Saving Lives Requires a Rapid Synoptic Overview of Effects and Damage"**, will provide a glimpse into the future of imaging and geospatial technologies in helping humankind mitigate the impacts of natural hazards on our lives and livelihoods. Recent natural calamities, such as earthquakes, tsunamis, wildfires, and numerous others, are stark evidence that there is still much to learn and understand about our Earth.

Becoming reacquainted with and meeting new colleagues has been a hallmark of ASPRS conferences throughout their history. Sacramento 2012 will be no exception. Technical sessions; poster sessions; coffee breaks; the exhibit hall; a variety of networking events, such as the regional social in Old Town Sacramento, and the gala conference social event at the California Automobile Museum will all provide ample opportunity to make and renew those professional and social friendships.

Recent membership assessments have revealed that ASPRS members are generally satisfied with current benefits of ASPRS membership, including ASPRS conferences. We sincerely hope that you will find Sacramento 2012, not merely a satisfying experience, but one that exceeds all your expectations. If you're not a member, now is the time to join and learn what ASPRS members already know, that ASPRS provides excellent technical programming and networking opportunities at their national conferences.

Looking forward to seeing you in Sacramento in March 2012! Please check the ASPRS conference website, http://www.asprs.org/Annual-Conferences/Sacramento-2012 /, to learn more.

George Hepner
Conference Co-Director

Alan Mikuni
Conference Co-Director

Students & Young Professionals

Please join the Student Advisory Council (SAC) for some activities designed just for YOU!

Student & Employer "Meet and Greet"
Thursday, March 22nd, 11 am to 12 Noon

This great event is designed to connect students looking to apply for jobs in the digital mapping industry and employers looking to hire! Bring your resume, a business card, or just a smile and a handshake, and expand your job network at the conference.

ASPRS has been kind enough to set up an official interview room for this conference, so use this meet and greet to determine if you should sign up for an interview slot.

Student Icebreaker
Tuesday, March 20th, 5:15 pm to 5:45 pm

Whether this is your first ASPRS Conference or you have attended previous conferences, you are invited to join other students and young professionals from all over the world at this special event designed just for you! You will get to meet at least seven new people who may become your friends for the conference or the rest of your life. Make time for this FUN event!

Student Advisory Council Meeting (SAC)
Tuesday, March 20th, 5:45 pm to 6:15 pm

Get together with the other Students and Associate members of ASPRS and learn what the SAC has been working on and what is planned for the coming week. They would love to meet you and hear any ideas you may have to make your conference experience enjoyable. All are welcome to attend.

Exhibit Hall Guided Tour for Students
Wednesday, March 21st, 11:00 am to 12 Noon

The ASPRS Sustaining Members Council is hosting a guided tour of the exhibit hall for students. This is your opportunity to meet the exhibitors, up close and personal. Exhibit halls can be intimidating, but not after this personal tour. Meet at the main exhibit hall entrance doors to participate in this fun tour. See you there!

Other Social Activities:

Your SAC Networking Coordinator will arrange relaxed social gatherings after each of the day's conference activities. These events will allow you to get to know more of the students and young professional members of ASPRS. Attendees are welcome to join in on the fun. To find out about all the activities, visit the conference web page at www.asprs.org/Annual-Conferences/Sacramento-2012 and click on the Presenters & Students tab.

We guarantee that your participation in these activities will make your conference experience more enjoyable!

	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	Noon	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM
Sunday, March 18th														
Registration Desk Hours											■	■		
Monday, March 19th														
Registration Desk Hours		■	■	■	■	■	■	■	■	■	■			
User Groups			■	■	■			■	■	■	■			
Workshops (1-7)			■	■	■	■	■	■	■	■	■			
Classified Session		■	■	■	■	■	■	■	■	■	■			
ASPRS Committee Meetings				■	■	■	■	■	■	■	■			
Tuesday, March 20th														
Registration Desk Hours		■	■	■	■	■	■	■	■	■	■			
User Groups			■	■	■			■	■	■	■			
Workshops (8-15)			■	■	■	■	■	■	■	■	■			
Student Icebreaker											■			
Student Advisory Council Meeting (SAC)												■		
Region Social Function													■	■
ASPRS Committee Meetings				■	■	■	■	■	■	■	■	■		
Wednesday, March 21st														
Registration Desk Hours		■	■	■	■	■	■	■	■	■	■			
Exhibit Hall Hours					■	■	■	■	■	■	■	■		
Exhibitors' Reception												■		
Keynote Address				■										
Technical Sessions				■	■			■	■	■				
Oral Poster Sessions				■	■			■	■	■				
23rd Annual Awards Luncheon & 78th Installation of ASPRS Officers						■	■							
Exhibit Hall Guided Tour for Students						■								
Thursday, March 22nd														
Registration Desk Hours		■	■	■	■	■	■	■	■	■	■			
Exhibit Hall Hours				■	■	■	■	■	■	■				
President's Address/General Session			■											
Technical Sessions				■	■			■	■	■				
2012 Memorial Address							■							
California Automobile Museum													■	■
Student & Employer "Meet and Greet"						■								
Friday, March 23rd														
Registration Desk Hours		■	■	■	■									
Exhibit Hall Hours			■	■	■									
Breakfast with Exhibitors			■											
Technical Sessions				■	■	■								

This chart is a general representation of when things will occur at the conference; however, please consult the rest of the program for more complete information about dates and times of specific sessions and activities. Also, this chart could possibly change between the Preliminary and Final Program publication.

ASPRS Committee Meetings

All ASPRS committees, scheduled to meet during the ASPRS 2012 Annual Conference, are listed below with their specific meeting time. Room locations will be determined at a later date and will be listed in the Final Program. Committee meetings will be held in the Sacramento Convention Center, Sacramento, California. The ASPRS Board will meet on Friday, March 23rd and the Conference will officially begin on Wednesday, March 21, 2012. Please plan your schedules accordingly.

Monday, March 19, 2012

Division Directors
Monday, March 19, 9:00 am to 10:00 am

Committee Chairs
Monday, March 19, 9:00 am to 10:00 am

Journal Policy & Publications Committee (Joint Meeting)
Monday, March 19, 10:00 am to 12 noon

Awards Committee
Monday, March 19, 10:00 am to 12 noon

Electronic Communications Committee
Monday, March 19, 1:00 pm to 2:00 pm

Education & Professional Development Committee
Monday, March 19, 1:00 pm to 3:00 pm

Remote Sensing Applications Division (RSAD) Analysis & Applications Subcommittee
Monday, March 19, 2:00 pm to 3:00 pm

Remote Sensing Applications Division (RSAD)
Monday, March 19, 3:00 pm to 4:00 pm

Region Officers
Monday, March 19, 3:00 pm to 4:00 pm

New Board Orientation
Monday, March 19, 4:00 pm to 5:00 pm

Bylaws Committee
Monday, March 19, 4:00 pm to 5:00 pm

Anyone interested in the work of an ASPRS Division or Committee is welcome to attend these Committee and Division meetings. Your participation is encouraged.

Tuesday, March 20, 2012

Data Preservation & Archive Committee
Tuesday, March 20, 9:00 am to 10:00 am

Photogrammetric Applications Division (PAD)
Tuesday, March 20, 9:00 am to 10:00 am

Geographic Information Systems Division (GISD)
Tuesday, March 20, 10:00 am to 12 noon

Evaluation for Certification Committee
Tuesday, March 20, 10:00 am to 11:00 am

Sustaining Members Committee
Tuesday, March 20, 11:00 am to 1:00 pm

Membership Committee
Tuesday, March 20, 1:00 pm to 2:00 pm

Lidar Division (LD)
Tuesday, March 20, 1:00 pm to 2:00 pm

Convention Policy & Planning Committee
Tuesday, March 20, 2:00 pm to 4:00 pm

Photogrammetric Applications Division (PAD) Softcopy Subcommittee
Tuesday, March 20, 2:00 pm to 3:00 pm

Professional Practice Division (PPD)
Tuesday, March 20, 3:00 pm to 4:00 pm

Primary Data Acquisition Division (PDAD)
Tuesday, March 20, 4:00 pm to 5:00 pm

Division Directors
Tuesday, March 20, 5:00 pm to 6:00 pm

Films Committee
Tuesday, March 20, 5:00 pm to 6:00 pm

Friday, March 23, 2012

ASPRS Board Meeting
Friday, March 23, 8:00 am to 5:00 pm

User Groups

KLT Associates, Inc.
Monday, March 19th, 8:00 am to 12 Noon

GeoDigital
Monday, March 19th, 8:00 am to 12 Noon

Exelis Visual Information Solutions
Monday, March 19th, 1:00 pm to 5:00 pm

Please join the ENVI team for the ENVI User Group Meeting at ASPRS. This session will feature presentations by image analysis and GIS professionals who will demonstrate how they use ENVI to solve real world problems. In addition, you will learn latest advances from the ENVI development team, including new features and updates on the ENVI product roadmap.

NOAA
Monday, March 19th, 1:00 pm to 5:00 pm

The mission of NOAA's National Geodetic Survey is to define, maintain and provide access to the National Spatial Reference System to meet our nation's economic, social, and environmental needs. NGS provides the framework for all positioning activities in the Nation. The foundational elements - latitude, longitude, elevation and shoreline information - contribute to informed decision making and impact a wide range of important activities including mapping and charting, flood risk determination, transportation, land use and ecosystem management.

New Tech Services, Inc.
Monday, March 19th, 1:00 pm to 5:00 pm

New Tech Services, Inc. specializes in the Sales of pre-owned Aerial Survey/Mapping equipment. NTS also markets a Photo Mission Planning Tool to calculate the amount of images needed anywhere, accurately and cost efficient. All data can be exported to most FMS. New in version 8.1: download Maps directly from Google into TopoFlight with selectable resolution. TopoFlight Navigator is the Flight Management System. Visit: www.nts-info.com and www.TopoFlight.com for more info.

Please contact: Tony at nts@nts-info.com 1-281-573-8029.

BAE Systems
Tuesday, March 20th, 8:00 am to 12 Noon

The future of SOCET SET is here! Learn how to build and complete photogrammetric workflows in SOCET GXP v4.0 to increase productivity. The intuitive Microsoft Office Fluent user interface organizes the workspace to simplify tasks. New functionality offers rigorous photogrammetry, including 3-D site and city modeling, automatic feature extraction, and advanced terrain editing (TIN and Grid, including LIDAR point clouds). In addition, see the new tool that everyone is talking about — GXP Xplorer — for efficient data management.

Esri
Tuesday, March 20th, 8:00 am to 12 Noon

The Esri User Group meeting, at the ASPRS 2012 Annual Conference, is a gathering of remotely sensed data and imagery users and those who are interested in best practices for remotely sensed data, imagery and GIS. Highlights will include presentations on the future direction of the ArcGIS system for remote sensing professionals, Esri technology demonstrations, and time for user questions and answers.

Geographic Resource Solutions
Tuesday, March 20th, 8:00 am to 12 Noon

Please stop by the GRS Land Cover Mapping User's Group to discuss the GRS Densitometer and techniques for using point-transect sampling for estimating vegetation cover, fuels, and ground conditions. Discussions will include applying these field techniques to collect ground truth and accuracy assessment data for land cover mapping. We will also share techniques for site selection and field logistics for collecting ground truth and accuracy assessment data over very large areas.

Intergraph, Leica Geosystems and ERDAS
Tuesday, March 20th, 8:00 am to 12 Noon

Together, Intergraph, Leica Geosystems and ERDAS and provide leading hardware and software tools to support the complete geospatial information lifecycle - accurately capturing high-quality imagery, providing photogrammetry and remote sensing data analysis, and managing and delivering data to transform vector, raster and terrain information into fully integrated geospatial solutions.

Intergraph, Leica Geosystems and ERDAS and are wholly owned subsidiaries of Hexagon AB, a leading global provider of precision measurement technology.

ASD
Tuesday, March 20th, 1:00 pm to 5:00 pm

Solve your most challenging hyperspectral and environmental measurement problems at the ASD User Group. This meeting will include an instructional presentation at 1:30 and 3:30. Each presentation is followed by an open workshop to discuss your specific applications.

Experience the industry-standard FieldSpec line of rugged, portable spectroradiometers and talk with our product experts to learn why these powerful instruments are unparalleled in providing high-quality field results...and why ASD is the top choice for remote sensing and environmental sciences researchers.

ASD Inc. ● 303-444-6522 ● HYPERLINK "mailto:sales@asdi.com" sales@asdi.com ● www.asdi.com.

GeoCue Corporation/QCoherent Software
Tuesday, March 20th, 1:00 pm to 5:00 pm

Please join us for our combined GeoCue, QCoherent Spring User Group Meeting. During this session, we will not only update you on the latest GeoCue workflow integration solutions but also provide an overview of LIDAR Production tools from initial data processing through data dissemination and on to exploitation in an ArcGIS environment. In addition to updates on GeoCue and LP360, we will have a special focus on the complete integration of LIDAR data management from processing through distribution to end users via web tools.

Microsoft
Tuesday, March 20th, 1:00 pm to 5:00 pm

Join the technical experts and business leaders from Microsoft's UltraCam product group along with business partners in this half day presentation for an opportunity to learn firsthand about the company's latest aerial mapping sensor and software product advancements as well as the latest business developments. Prizes will be raffled, refreshments will be served, and seating will be limited so be sure to arrive early.

Optech Incorporated
Tuesday, March 20th, 1:00 pm to 5:00 pm

This workshop will provide information on Optech's latest efforts in hardware and software development. Focused presentations on new camera hardware releases and ALTM upgrade packages will be conducted, as well as a user training session featuring Optech's all-new flight management system, Optech FMS.

Topcon Positioning Systems
Tuesday, March 20th, 1:00 pm to 5:00 pm

Join us as we present how Topcon Mobile mapping hardware and software tools can improve data workflows and increase production. Our session will include presentations and demonstrations focusing on workflows that can easily manage and manipulate geospatial information for a variety of applications. Through the integration of 360° images and high density point cloud, we get a superior data-set for feature recognition and data extraction. Come explore the latest developments in mobile mapping technology and how it can keep you on the cutting edge!

Vr Mapping

VrOne
A powerful, fast photogrammetric collection package with DTM, raster display, interactive edit and batch processing.
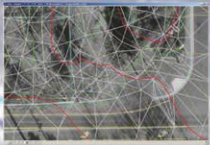
VrTwo
The seamless combination of interactive graphics and stereo imagery. The power of VrOne highlights the VrTwo softcopy software.
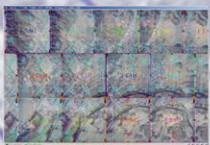
VrLiDAR
The integration of LiDAR data and applications into the VrOne and VrTwo products, offering four collection and editing environments.

VrOrtho
Process small jobs interactively or large jobs in batch mode. This stand-alone program is easy to use with an intuitive work flow.
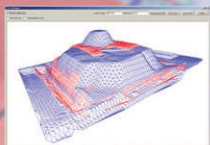
VrAirTrig
Easy to learn, easy to use and affordable. An innovative and familiar approach with the traditional table layout going digital.

VrMosaic
An on the fly seam line editor with the ability to splice, combine and balance images. More control of the mosaic process with interactive image display.

VrVolumes
A DTM based computational method is used to calculate volumes from surface triangles. Cut and fill results between known or assumed surfaces.

VrLite
Based on the powerful VrOne and VrTwo products, this light version puts the power of Vr Mapping in more locations.

The NEW standard

Mapping today requires professionals to collect, process and deliver vector, LiDAR, image, DTM and GIS data, often together. Vr Mapping Software addresses these needs in an easy and pragmatic way.

Having been continually developed over a 25 year period, Vr Mapping Software has evolved into the most practical tool available.

cardinal systems

www.cardinalsystems.net

WORKSHOPS

Workshop #1
NEW!
Unmanned Aerial System (UAS) Concepts

Kevin Gambold, *Unmanned Experts LLC*
Stephen Rolfe, *Unmanned Experts LLC*
Monday, March 19, 7:45 AM to 5:15 PM, CEU .8
Fee — Non-Member: $335, Member: $235, Student: $125

INTERMEDIATE WORKSHOP

The civilian aviation sector of unmanned aerial vehicles (UAV) and systems (UAS) is rapidly expanding, and is predicted to match the successful military application of UAVs. Recent studies have drawn up over 53 different mission types for civilian UAS, grouped into 5 mission sets of Survey, Law Enforcement, Border Patrol, Communications and Disaster Relief.

Companies are looking to this area to solve specific operational problems, using the traditional strengths of UAS over manned platforms, epitomized by the phrase 'the 3 Ds: Dull, Dirty and Dangerous'.

This UAS Concepts Workshop was designed to provide experienced airborne photogrammetry and remote sensing operators, technologists, and scientists with an understanding of UAVs/UAS that goes beyond an introductory level, and allows them to speak knowledgeably of this area to their management, customers, and peers.

This day-long instructional program includes:
- Overview; UAS Terminology and Classification; UAS Roles and Mission Sets
- Control Systems; Data Links; Hardware
- Payloads: EO/IR/LLTV/SAR/GMTI/Hyperspectral
- Concept of Operations; Launch Recovery Systems; Communications
- Deployment Considerations; Future Employment of UAS

Our instructors have extensive operational UAS experience and have delivered leading-edge UAS training materials to an wide spectrum of audiences.

This course assumes that attendees have an intermediate to advanced understanding of airborne operations, and a basic understanding of photogrammetric and remote sensing principles that have their equivalents in military intelligence, surveillance, and reconnaissance (ISR) fundamentals.

Workshop #2
Image Classification Considerations for the Development of Accurate, Detailed, and Quantitative Land Cover Map Data

Kenneth Stumpf, *Geographic Resource Solutions*
John Koltun, *Geographic Resource Solutions*
Monday, March 19, 7:45 AM to 5:15 PM, CEU .8
Fee — Non-Member: $335, Member: $235, Student: $125

INTRODUCTORY WORKSHOP

This workshop is designed as a workflow that takes participants through the different stages of an image classification land cover mapping (data development) project while identifying problems, issues, and concerns and comparing and contrasting traditional and alternative techniques. The workshop is built around the four major parts of **GRS**'s Discrete Classification Methodology used for our Image Classification Projects - Data Acquisition and Preparation, Image Classification, Pixel to Polygon Conversion, and Accuracy Assessment. Workshop examples are based on actual project results from efforts in California, the Pacific Northwest, and Alaska.

- **Data Acquisition and Preparation** — The instructors present issues, problems, concerns, and alternative perspectives regarding image procurement; terrain-sensitive illumination correction; implementation of GIS and database capabilities to minimize planning and field data collection efforts, while maximizing results; and image classification strategies and methods. The workshop includes crucial GPS issues for aerial/field data gathering efforts; use of data-loggers to standardize data collection and guide field efforts; advantages of and techniques for quantitative data collection; the use of in-situ classifications to monitor field progress; and field data verification techniques.
- **Image Classification** — The workshop agenda then progresses into a discussion of image training and classification issues, expanding on an alternative treatment of cover characteristics and class data to maintain land cover detail information at the pixel level; techniques for the resolution of confusion; and development of a final pixel map.
- **Pixel to Polygon Conversion** — For those concerned with developing vector data from the pixel data set, GRS discusses traditional pixel-cleanup techniques such as segmentation and pixel filtering. GRS then presents an alternative methodology for the development of polygon data (that meet minimum mapping unit area criteria) by means of rule-based aggregation processes designed to improve land cover mapping results.
- **Accuracy Assessment** — The workshop wraps up with a discussion of Accuracy Assessment procedures followed by a "Questions and Answers" session. Accuracy assessment includes a discussion of field sample design, Error Matrices, and biases that must be avoided during an accuracy assessment.

I. Introduction
  A. Traditional image classification, output, and alternatives
    1. categorical map data
    2. quantitative map data
  B. An alternative classification methodology
  C. Comparison of classification data products
II. An Alternative Land Cover Mapping Approach
  A. Data acquisition and preparation
    1. procurement considerations
    2. illumination normalization
    3. training site selection
    4. quantitative "ground-truth" - field data collection
  B. Image classification
    1. Training Set Development
    2. Classification
      a. supervised
      b. unsupervised
    3. identification and resolution of confusion
      a. confusion report
      b. fidelity testing and report
      c. winter imagery
  C. Rule-based pixel aggregation to polygons
    1. mathematical filtering
    2. rule-based aggregation
  D. Accuracy assessment
    1. error matrices
    2. sources of bias
III. Summary
  A. The land cover mapping strategy
  B. Questions

Workshop #3

Hyperspectral Image Processing and Feature Extraction: Maximizing Geospatial Information Retrieval

William Farrand, *Space Science Institute*
Stuart Blundell, *Overwatch Geospatial, Ltd.*
Monday, March 19, 7:45 AM to 5:15 PM, CEU .8
Fee — Non-Member: $335, Member: $235, Student: $125

INTRODUCTORY WORKSHOP

Imaging spectrometry, commonly referred to as hyperspectral remote sensing, provides high-resolution spectral information for environmental, natural resources, and urban characterization projects. Hyperspectral image processing approaches can also be applied to new, high-resolution, broadband multispectral imagery obtained from commercial satellites such as WorldView-2. The workshop will demonstrate how results from these analyses can be used to enhance automated feature extraction techniques. In this workshop, we will provide students with an introduction to the phenomenology of imaging spectrometry, hyperspectral image processing techniques, and feature extraction approaches to demonstrate how to add value to the maintenance of geospatial databases. We will emphasize that the added value in imaging spectrometry is on the *spectrometry*, the ability to identify materials based on their reflectance signatures. We will briefly discuss the phenomenology of reflectance spectrometry and explain why some materials are more amenable to mapping than others. We will describe commercially available processing systems that are available for processing hyperspectral and multispectral data and discuss the processing techniques within those packages. Certain processing techniques are better suited to certain applications. We will explain why this is so. We will also discuss some of the advantages and shortcomings of current airborne and orbital hyperspectral systems as well as planned systems.

Hyperspectral imagery provides users with discrete spectral, and consequently compositional, information about Earth surface materials. The ability to integrate other types of geologic, geochemical, biologic, or hydrologic data with information from hyperspectral data improves the interpretation and mapping process. The student will be introduced to the concepts of developing feature extraction models for assisted and automated feature extraction approaches using hyperspectral, Lidar, DEMs and multispectral data. We will provide real-world examples of how end products, derived from hyperspectral and multispectral data processing, including resultant mineral and vegetation species maps, can be extracted using commercial feature extraction software.

We will provide a package of materials to the students that will include hard copies of the material presented and an extensive list of references on the topics addressed. We will engage the class with an in-class exercise and several "take-home" hands-on exercises.

Topics to be addressed
  I.   Define Imaging Spectrometry (Hyperspectral Remote Sensing)
  II. The Phenomenology of Reflectance Spectrometry
  III. Object Recognition and Feature Extraction Using Spatial and Spectral Attributes
  IV. Commercially Available Hyperspectral Imaging (HSI) Software Packages
  V.   Processing Techniques for Applications of HSI and MSI (Dem-Onstration)
  VI. Feature Extraction Strategies Using HSI, Lidar and MSI Data Sets
  VII. Descriptions of Available and Soon-to-be Available Hyperspec-Tral Systems
  VIII. Exercises
  IX. Case Studies
  X.   Summary and Final Discussion

Workshop #4 *NEW!*

Vegetation Analysis and Moisture Content Assessment in Urban Areas Using Remote Sensing Data

Dr. Indu Jeyachandran
Monday, March 19, 7:45 AM to 12:15 PM, CEU .4
Fee — Non-Member: $280, Member: $180, Student: $190

INTERMEDIATE WORKSHOP

This half-a-day workshop explores the use of remote sensing data (Landsat data) for a range of urban applications. The workshop aims at educating the audience to compute remote sensing based indices such as Normalized Difference Vegetation Index, Moisture Stress Index (MSI), Enhanced Vegetation Index (EVI), Simple Ratio Index (SRI) and Normalized Difference Water Index (NDWI). Using the indices, an exercise will be performed in the workshop to assess the vegetation health, moisture content and identify urban sites with water stress in a study area. Also the users will get hands on experience in calculating the vegetated fraction from remote sensing data. A simple example to demonstrate the use of fractional vegetation cover in calculating the irrigation demand of a study area will be illustrated in the workshop. The objective of the workshop is to expose the users to the applications of remote sensing data in urban areas.

Workshop #5

Calibrating Film and Digital Sensors for Today's Geo-Spatial Business

Dr. Qassim Abdullah, *Fugro EarthData, Inc*
Don Light, CP, *Rochester Institute of Technology*
Monday, March 19, 7:45 AM to 12:15 PM, CEU .4
Fee — Non-Member: $280, Member: $180, Student: $190

INTERMEDIATE WORKSHOP

The workshop introduces important topics related to the calibration process of film and digital sensors including the Mathematics and techniques for data acquisition.

Among the topics are:
  I.   What is Camera Calibration and Why is it Necessary?
  II.   An Overview of Different Architectures for Digital Sensors and Their Geometry;
  III. Procedures and Mathematical Models Employed in Calibrating Digital Sensors;
  IV.   Self Calibration Techniques as Practiced Today in the Aerial Imaging Industry;
  V.   Design and Illustration of Indoor and In Situ Calibration Fields;
  VI.   Typical Sensor Calibration Reports;
  VII. Agencies and Companies Providing Sensor Calibration;
  VIII. Commercially Available Software for Sensor Calibration.

Workshop #6

Principles and Practice of Synthetic Aperture Radar

Dr. Don Atwood, ASF Chief Scientist, *University of Alaska Fairbanks*
Monday, March 19, 12:45 PM to 5:15 PM, CEU .4
Fee — Non-Member: $280, Member: $180, Student: $190

INTRODUCTORY WORKSHOP

Synthetic Aperture Radar (SAR) data is becoming increasingly available with the launches of Radarsat-2, TanDEM-X, COSMO-SkyMed, and the impending launch of ESA's Sentinel-1. Besides the obvious advantage of providing imagery day/night and independent of weather, SAR is being used for a wide variety of applications. It can be used to measure surface elevation, biomass, tree height, subsidence, seismic motion, freeze/thaw, soil moisture, glacier motion, and sea ice tracking. This course will introduce the student to the fundamental concepts behind SAR and Interferometric SAR (InSAR). With an intuitive grasp of how SAR images are processed, the student will be exposed to a range of practical applications. Students will be asked to bring a computer in order to terrain-correct SAR data in preparation for GIS. To maximize the benefits of this course, participants should have previous experience with GIS and remotely sensed data.

 I. Introduction
 II. A Historical Review of RADAR
 III. The Electromagnetism of RADAR
  A. Frequencies, wavelengths, and bands
  B. Phase and amplitude
  C. Coherent Signals
 IV. Creating the Synthetic Aperture from a Moving Platform
 V. SAR Image fFormation
 VI. Image Interpretation
  A. Target interactions
  B. Layover, foreshortening, and shadow
 VII. Class Exercise: Producing a GIS-ready Image
 VIII. Interferometry: Utilizing the SAR Phase
 IX. Selected Examples for GIS
 X. Becoming a SAR User.

Workshop #7

Digital Terrain Models – Algorithms and Mathematical Procedures

Yaron Felus, PhD, PS, *Survey of Israel and the Technion – Israel Institute of Technology*
Monday, March 19, 12:45 PM to 5:15 PM, CEU .4
Fee — Non-Member: $280, Member: $180, Student: $190

INTERMEDIATE WORKSHOP

In order to maximize the benefits of this workshop, participants should have an understanding of fundamental GIS principles. Moreover, basic knowledge of math, statistics and geometry is strongly suggested.

 The primary objective of this workshop is to present algorithms and techniques to create, analyze, and utilize Digital Terrain Models (DTM). Basic spatial data structures such as Delaunay triangulation, Voronoi diagram, and Quadtrees will be described. Mathematical procedures for interpolation such as linear, trend estimation, inverse distance and Kriging, will be studied using numerical examples. Finally, advanced methods for DTM visualization, analysis and integration such as contouring, 3D scene creation, drainage network, viewshed, and watershed delineation, and co-Kriging will be presented.

 I. Introduction
 II. Spatial Data Structures:
  A. Vector data
  B. Introduction to spatial tessellation
  C. Definition of Triangulation, the Delaunay Triangulation
   1. (DT) properties
   2. (circum-circle criterion)
  C. Incremental and static algorithms for DT construction (example)
  D. Triangulation with break lines – constrained triangulation
  E. Voronoi diagram, definition and construction procedure – (optional)
   1. grid or raster data
    a. image pyramid
    b. quadtrees: algorithms, advantages, disadvantages, example - (optional)
 III. Mathematical Procedures for Interpolation
  A. Statistical thinking, mean, median and variance analysis of spatial data
  B. Concept of proximity
  C. Inverse distance interpolation (example)
  D. Trend estimation (example)
  E. Linear interpolation using DT (example)
  F. Kriging, variogram estimation, and prediction. (example)
  G. Interpolation techniques pros and cons
 IV. DTM Visualization Techniques
  A. Contouring procedures (The Level Curve Tracing contouring Algorithm)
  B. Shaded relief maps
  C. Advanced visualization methods (3D scenes, and flythrough movies).
 V. DTM products or data fusion techniques (as will be determined by the workshop attendees)
  A. Computing slope and aspect using GRID and TIN DEM. (example)
  B. Calculating line of sight, and viewshed modeling (example)
  C. Drainage analysis, and watershed modeling (example)
   1. data fusion methods.
   2. Co-Kriging

Workshop #8

NEW!

Image Geometric Correction: An Extensive Approach

Álvaro Burgos, *University of Costa Rica* and *National University – Costa Rica*
Tuesday, March 20, 7:45 AM to 5:15 PM, CEU .8
Fee — Non-Member: $335, Member: $235, Student: $125

ADVANCED WORKSHOP

This full day workshop is intended for advanced students interested in image processing tasks. The main objectives are: provide thorough explanation how remotely sensed imagery can be transformed to approximate map geometry, and secondly showing that a process most of the time carried out with a "black box" can be applied with simpler tools. No commercial image processing software is used. Image coordinates are read using Multispec, developed at Purdue University. Printed maps combined with rulers, pencil, eraser and paper sheets are used to register map coordinates. Transformation parameters are calculated using a spread sheet. Geometrically corrected images and positional error distribution assessment over the image are obtained using the ANIMA image processing system developed at the Center for Geophysical Research, University of Costa Rica. ANIMA programs should be executed from the operating system prompt of the Microsoft Windows environment. The workshop includes: theoretical aspects regarding geometric transformation, sub scene extraction from historical Landsat Thematic Mapper data, ground control point coordinate readings on both, image and cartographic space, transformation parameters determination using a spread sheet program, image transformation, positional error images and numerical and graphical results are assessed, geometrically corrected images are displayed as well as the images portraying estimated positional errors over the remotely sensed image, final discussion among participants about the relevance of the workshop.

Attendees are encouraged to bring their own laptops to this workshop for some hands on work during the workshop. The laptop should run under the Microsoft Windows XP Operating system at 32 bit. The program to rectify images is a 16 bit program, and was produced to work with personal computers running under the old MS-DOS V. 6.2. Consequently, in PC's with the Windows XP OS, the program should be executed from the system prompt. Also bring, pencil, eraser, pencil sharpener, scalimeter or ruler with scale in the metric system, and sheets of paper.

Workshop #9

Airborne GPS and Inertia in Support of Triangulation and Orientation of Airborne Framing and Push Broom Sensors

Dr. Qassim Abdullah, *Fugro EarthData Inc.*
Dr. Riadh Munjy, *California State University - Fresno*
Tuesday, March 20, 7:45 AM to 5:15 PM, CEU .8
Fee — Non-Member: $335, Member: $235, Student: $125

INTERMEDIATE WORKSHOP

I. Introduction to GPS- and IMU-controlled AT
   A. Objective
   B. Benefits
II. Fundamentals of an Airborne GPS and IMU Integrated System
   A. Operational principles and requirements of a GPS system
   B. Operational principles and requirements of an IMU system
III. Functional System Design and Requirements for an Airborne GPS/IMU Integrated photogrammetric system
   A. Geometric integration of airborne sensors
   B. Electronic integration of airborne sensors
   C. System calibration
IV. Flight Design and Control Criteria for Cuccessful Airborne GPS-controlled Missions for Framing Fameras (Analog or Digital)
   A. Flight configuration
   B. Ground control configuration

V. Incorporating Airborne GPS and IMU Data in the Mathematical Model for Bundle Adjustment of AT Blocks
   A. Incorporating airborne GPS data
   B. Incorporating airborne IMU data
VI. Fundamental of the Push-broom Digital Photography, the ADS40 case
   A. Image formation with ADS40 push broom digital aerial camera
   B. Image characteristics at various processing levels
VII. Flight Design and Control Criteria for Successful Airborne GPS-controlled Missions for Push-broom Digital Camera (ADS40)
   A. Flight configuration
   B. Ground control configuration
VIII. Processing Flow for Bundle Adjustment of Imagery from Frame and Push Broom Cameras
   A. Input data requirements
   B. Systematic error corrections
   C. Data analysis
IX. Practical Results and the Status of Airborne GPS and IMU-Controlled Aerial-triangulation in Production Today.

Workshop #10

Object Oriented Image Classification: From Feature Extraction to Land Cover Mapping

Ms. Kass Green, *Kass Green & Associates*
Dr. Russell Congalton, *University of New Hampshire*
Tuesday, March 20, 7:45 AM to 12:15 PM, CEU .4
Fee — Non-Member: $280, Member: $180, Student: $190

INTRODUCTORY WORKSHOP

This workshop introduces attendees to object oriented image classification. Unlike per pixel classifiers which rely only on the spectral characteristics of a feature, object oriented classifiers are capable of utilizing all feature characteristics including color, tone, texture, shape, height, and context. While powerful in the classification of moderate resolution data (e.g. Landsat), object oriented classification is pivotal for using high resolution (e.g. NAIP and commercial satellite imagery), because of the imagery's mixture of shadow and illuminated features, and the need to group pixels together to map land use land classes (e.g. a suburb or a forest) instead of individual features such as single trees. With the recent explosion in availability of high resolution imagery, knowledge of object oriented image classification is critical to map users and producers alike.

Topics covered by the course include:

I. A Brief Summary of the Basic Concepts of Image Classification – Common Constructs Of Photo Interpretation, Per Pixel Classification And Object Oriented Classification
II. Objects Verses Per Pixel Classification – When to use What
III. Principles of Object (Segment) Creation – What's Inside the Black Box
IV. Approaches to Labeling Objects Including Hierarchical, Expert Rule, and Classification and Regression Tree (Cart) Methods.
V. Special Considerations for the Accuracy Assessment of Maps Created from Object Oriented ClassIfications.
IV. Overview and Comparison of Object Oriented Cots Software and Tools.

Real life case studies will be interspersed throughout the workshop and will include using object oriented classification to map

- General land cover and land use for urban water run-off management
- Detailed vegetation associations of Grand Canyon National Park, and
- Benthic habitat and propeller scars in the Gulf of Mexico.

Workshop participants currently using object oriented classification are encouraged to discuss their projects and be prepared for a lively discussion on the pros and cons of different approaches.

Workshop #11
Looking Above the Terrain: Lidar for Vegetation Assessment

Dr. Sorin C. Popescu, *Texas A&M University*
Tuesday, March 20, 7:45 AM to 12:15 PM, CEU .4
Fee — Non-Member: $280, Member: $180, Student: $190

INTERMEDIATE WORKSHOP

The participants are expected to have a basic understanding of remote sensing techniques and image processing. The overall goal of this half-day workshop is to introduce participants to lidar concepts, processing techniques, and applications for deriving information on forest vegetation resources and canopy parameters. More specific objectives are to: (1) familiarize participants with basic laser ranging concepts and lidar data structure; (2) introduce types of lidar sensors for forest vegetation assessment – discrete-return, waveform encoding, flash lidar, etc., on ground-based, airborne, and satellite platforms; (3) the LAS lidar data format; (4) review algorithms for deriving information on terrain elevation and canopy height models; (5) introduce the concept of "multi-band" lidar height bins generated using lidar point cloud data; (6) review processing techniques for analyzing forest structure and deriving vegetation information at individual tree, plot, and stand level; (7) introduce participants to TreeVaW, a lidar processing software for identifying and measuring individual trees on lidar-derived canopy height models, and other software resources; and (8) present a comparison of forest structure metrics obtained by processing ICESat waveform data and spatially coincident discrete-return airborne lidar and ground-based laser scanner data of forest vegetation.

Workshop content can be summarized as follows:

   I.   Types of Lidar Sensors. Why use Lasers for Range Finding?
   II.   The Las Lidar Data Exchange Format.
   III.   Full Waveform vs. Discrete-returns, Small Footprint vs. Large Footprint Lidar; Lidar Waveforms vs. Pseudo-waveforms. Scientific Visualization of Lidar Data.
   IV.   Approaches to Lidar Processing for Deriving Terrain Elevation and Assessing Forest Vegetation: Lidar Discrete Points or Interpolated Surfaces?
   V.   Seeing the Trees in the Forest: Direct Lidar Measurements at Individual Tree Level – Tree Height, Crown Diameter, Crown Base Height, and Stand Density.
   VI.   Treevaw: An Automated Software Application using Adaptive Filtering to Locate and Measure Individual Trees in Complex Canopy Structures; Other Software Resources.
   VII.   Lidar-derived Biophysical Parameters: Volume, Biomass, Percent Canopy Cover, Leaf Area Index, and Forest Fuel Models; Assessing Risk Of Insect Damage; Lidar-Multispectral Fused Imagery.

Workshop #12
NEW!
Photogrammetric Processing: Surface Model and Orthophotograph Workshop

Jennifer Nix, *DigitalGlobe Inc.*
Jon Proctor, *DigitalGlobe Inc.*
Tuesday, March 20, 7:45 AM to 12:15 PM, CEU .4
Fee — Non-Member: $280, Member: $180, Student: $190

INTERMEDIATE WORKSHOP

The purpose of this new workshop is to walk the audience through the entire photogrammetric process of creating surface models all the way though the creation of Orthophotography. We will begin with the simple review of stereo imagery. Creating optimal stereo is easy once the three major stereo angles (Convergence Angle, Asymmetry Angle, and Bisector Elevation Angle) are acquired within a specified tolerance. We will show and describe each of the three stereo angles. We will also discuss the affect of going outside the angle tolerance does to the parallax and accuracy of the end product. Next we will review the importance of an accurate and successful triangulation report and how that applies to both surface modeling and the final Orthophoto. Once the stereo mates and an ample triangulation solution have been identified, an accurate Digital Elevation Model, Digital Terrain Model, Digital Surface Model, feature extractions, and 3D models can be created. We will discuss post spacing, contour intervals, and basic terrain enhancing techniques to aid in the rectification of the imagery. The end user will leave the workshop knowing the differences between Digital Elevation Models, Digital Terrain Models, and Digital Surface Models. We will talk about the pros and cons of each and how they apply to creating a successful and accurate orthophoto. We will also discuss quality assurance, quality control, and troubleshooting techniques if areas need to be corrected. Each photogrammetric process will be described at a beginning to an intermediate level. The audience member should have some familiarity with the photogrammetric process. Many examples will be given to help emphasize and help visualize the photogrammetric process. The audience will be encouraged to share their successes and lessons learned in their own Modeling and Orthophoto experience.

Continuing Education Credits (CEU's)

ASPRS is pleased to announce that Continuing Education Units (CEUs) are awarded for the ASPRS workshops. This program is being offered in conjunction with George Mason University.

    The Continuing Education Unit (CEU) is a nationally recognized unit of measurement for participation in non-credit continuing education programs. Adults who successfully complete George Mason University's approved programs will be awarded continuing education units. A permanent record of CEUs awarded will be maintained in the university database and will be easily accessible for certification and verification purposes.

    The objective of the CEU is to:
- Provide a nationally established record of professional development learning activity
- Encourage adult students to utilize educational resources to meet their personal and educational needs
- Recognize individuals who continue their education and keep themselves current in their chosen professions
- Enable individuals to have an accurate source of their current CEU activity
- Provide a system to document continuing education experiences in meeting certification requirements.

George Mason University, Office of Continuing Professional Education is registered with the National Association of State Boards of Accountancy (NASBA), as a sponsor of continuing professional education on the National Registry of CPE Sponsors. State boards of accountancy have final authority on the acceptance of individual courses for CPE credit.

Workshop #13
NEW!

Developing Geographic Data Visualization Tools in an Open Source Environment

Kevin Koy, *UC Berkeley, Geospatial Innovation Facility*
Brian Galey, *UC Berkeley, Geospatial Innovation Facility*
Tuesday, March 20, 12:45 PM to 5:15 PM, CEU .4
Fee — Non-Member: $280, Member: $180, Student: $190

INTERMEDIATE WORKSHOP

This workshop will introduce participants to the process of developing web applications to visualize geographic data. There are many considerations that one must make today if they are to consider making data available through an online web mapping resource. We will walk through the steps to consider, and introduce several free and open source software options that are available to aid the process, including both conceptual and technical considerations. Presentation topics to include:

- **Conceptual Considerations** — We will explore the following topics, including a variety of examples from different sites around the web:
  - Understanding your audience. It is critical to establish who the tools will be designed for, general public, decision makers, technicians, experts, or all of the above. Development will be greatly shaped depending on your intended user's level of understanding and needs.
  - Understanding your data. What are the critical elements within your data that you are trying to communicate?
  - Understanding interactive capabilities. What type of functionality should a user have available to effectively interact with your data?
  - Utilizing feedback. What options are available for testing your products and refining design based on user feedback?
- **Technical Considerations** — We will explore the following topics, including quick tours of an open source software stack for web applications:
  - Server Configurations. What options are available to store your geospatial data and provide access through consumable web services?
  - Visualizations. What options are available to create interactive map based visualizations?
  - Query and Analysis. In what ways can you provide users with the ability to actively query and analyze your data online?

Workshop #14

Advanced Thematic Accuracy Assessment

Dr. Russell G. Congalton, Professor, *University of New Hampshire*
Kass Green, President, *Kass Green and Associates*
Tuesday, March 20, 12:45 PM to 5:15 PM, CEU .4
Fee — Non-Member: $280, Member: $180, Student: $190

ADVANCED WORKSHOP

This workshop is for those that have already performed one or more thematic accuracy assessments and/or have taken the Introductory Workshop on Assessing the Accuracy of GIS Information Created from Remotely Sensed Data. This workshop focuses on going beyond the basic principles and practices of thematic accuracy assessment. The workshop will begin with a brief review and then quickly switch focus to a discussion of the issues related to sample design considerations including sample unit, sample size, and sampling scheme and reference data collection issues. Analysis of the error matrix will be demonstrated by use of the software to compute both Margfit and Kappa. Each participant will leave with a copy of this software. Finally, development and use of the fuzzy error matrix will be presented and discussed. Example case studies will be used to demonstrate the appropriate considerations and issues throughout the workshop. Each participant should come prepared with questions and issues from their own work to share with the group and explore together.

- I. Introduction
- II. A Review of the Basics
  - A. Positional accuracy
  - B. Thematic Accuracy
    - 1. The Error Matrix
- III. Advanced Sample Design Considerations
  - A. Common issues
  - B. Creative solutions
  - C. Must document
- IV. Issues in Reference Data Collection
  - A. Trade-offs with sources
  - B. Collection methods
  - C. Efficiencies
  - D. Objectivity and bias
- V. Demonstrating Analysis Techniques
  - A. Kappa
  - B. Margfit
- VI. Fuzzy Accuracy Assessment
  - A. Motivation
  - B. Methodology
- VI. Conclusions

Workshop #15
Lidar Waveform: The Potential and Benefits for Topographic Mapping

Charles K. Toth, PhD, *Center for Mapping, The Ohio State University*
Nora Csanyi May, PhD, *Fugro EarthData, Inc.*
Tuesday, March 20, 12:45 PM to 5:15 PM, CEU .4
Fee — Non-Member: $280, Member: $180, Student: $190

INTERMEDIATE WORKSHOP

Intended audience:
In general, people are involved in all aspects of lidar. The proposed workshop is primarily beneficial to lidar data providers, both who have already started to look into full waveform applications or those who are just about to explore this emerging technology. In addition, government program managers and decision-makers should also find this workshop valuable.

This workshop will provide an introduction to lidar waveform data concepts and processing. Participants are expected to have basic understanding of Lidar technology. The structure of this workshop will be the following:

I.   Introduction to Lidar Waveform Data
   A.   What is lidar waveform data?
   B.   Short history on the evolution of waveform data
   C.   The characterization of waveform data
II. Acquiring Lidar Waveform Data
   A.   Large footprint systems
   B.   Small footprint pulsed Lidar systems
III. Real-time Processing of Lidar Waveform Data
   A.   Return and intensity signal detection (advantage/disadvantage of waveform vs. discrete returns)
   B.   Compression of Lidar waveform data
   C.   Storing Lidar waveform data
IV. Post-processing of Lidar Waveform Data
   A.   General analysis of waveform data; typical waveforms
   B.   Already existing applications using Lidar waveform data
   C.   Emerging applications, including land-cover (object) classification, better error characterization, etc.
V.   Summary and Future Trends
   A.   Existing systems
   B.   Outlook on market developments

It's a Party!

Welcome to the Regional Social for the 2012 Conference and to Old Sacramento!

This year's regional social event will be held at Fat's Catering and Banquet Facility which locals have known for years as "California Fat's" an icon of Old Sacramento's dining and night life.

Fat's Catering and Banquet Facility is located at 1015 Front Street in Old Sacramento; a pleasant walk from the conference hotel, head westward down the K Street Mall towards the old waterfront on the Sacramento River.

The Fat Family has been restaurateurs for over 75 years in Sacramento. California Fats on Front Street in Old Sacramento was their second restaurant - following their original 1930s lunch counter turned upscale '90s dining at 806 L Street, across from the State Capitol. Their restaurant in Old Sacramento is now available for events and banquets.

Behind the double doors that open up from Old Sacramento's waterfront, you step into a three level restaurant, on your left is a full service bar and gourmet kitchen, downstairs are quiet booths and a two story granite waterfall, upstairs is the Bamboo Room with a view overlooking the waterfall and downstairs.

The menu is best described as California-Asian. For our social mixer, Fat's Catering will be serving their favorites: Chicken Pot stickers with Chili Vinegar Sauce, Vegetable Dumplings, Thai Style Spring Rolls, Miso Salmon Skewers, Mandarin Duck on a Wonton with Plum Sauce, and Immigrants Beef in Mini Hawaiian Rolls.

Enjoy a complimentary favorite wine, beer or soft drink served from the bar. Grab an appetizer, wander around the upstairs and downstairs or just mingle with old friends. Then afterwards, step outside and discover Old Sacramento's nightlife. Enjoy!

Tuesday, March 20th starting at 6:00 pm.

Classified Session — New Frontiers in GEOINT Analytics

The National Geospatial-Intelligence Agency (NGA), in collaboration with Northrop Grumman Information Systems, will be hosting an all-day classified session in conjunction with the 2012 ASPRS Annual Conference. The purpose of the classified session is to engage the attendees in exploring views, ideas, approaches, and research results for *New Frontiers in GEOINT Analytics*.

The classified session will be held **March 19, 2012, 8 AM to 5 PM** at: Northrop Grumman Information Systems, 5441 Luce Avenue, McClellan, CA 95652. Note: Registration will be limited due to space constraints. All participants for the classified session must be pre-registered with ASPRS.

We have available computing power undreamed of just a generation ago. New phenomenologies are now available. At the same time, the GEOINT community is dealing with problems qualitatively different from those confronted in years past. How can the GEOINT community bring these new capabilities to bear on traditional and emerging GEOINT issues? Which capabilities, new or old, can best help solve recently-arising GEOINT problems?

The concept of GEOINT Analytics includes, but is not limited to:

- Massive Geospatial Data
- New sources and sensors
- Visual Analytics
- Predictive intelligence
- Signature development & discovery
- Precision GEOINT
- Public Derived Data Analysis
- Improving access to, and use of GEOINT content and services
- Strategic indications and warning

- Surface, subsurface, and above surface GEOINT
- GEOINT tradecraft
- Human Activity Analysis
- Spatial and Temporal Analysis
- Data Fusion
- Computational Geo-Analytics
- Evidence Based Anticipatory Analysis

<u>Morning Session</u>: Cutting edge research Presentations on New Frontiers in GEOINT Analytics.

<u>Afternoon Session</u>: In-depth round table discussions on New Frontiers in GEOINT Analytics.

<u>Classification Level</u>: This session will be held at the SECRET//Rel FVEY level.

Call for Papers

NGA is soliciting research papers and presentations of twenty to thirty minutes. Papers should address aspects of New Frontiers in GEOINT Analytics.

For more information on how to submit topics, visit www.asprs.org/a/Sacramento_2012/NGA_Call_5_Dec2012.pdf.

NGA is soliciting topics for in-depth round table research discussions in the afternoon sessions that address key challenges and potential solutions on important issues and problems related to New Frontiers in GEOINT.

Topics should focus on problems related to New Frontiers in GEOINT Analytics; why it is important to the intelligence and operational community; who is involved; and, the key issues addressed. The goal of the deep-dive session is to offer solutions and innovative approaches that address the type of sensor or data needed to tackle the problem. Selection of topics will be based on significance of the problem(s) being addressed, creative problem formulations, state-of-the-art and practices elucidations, innovative ideas, ingenious approaches, and imaginative research or application alternatives.

We welcome your suggestions on new problem-focused or research-focused topics and/or your interest and willingness to lead or support specific round table discussion areas in GEOINT Analytics such as:

- Massive Geospatial Data
- Tracking Ground-Based Vehicles and Indicators
- Broadening and deepening GEOINT tradecraft
- Exploiting Video
- Characterizing and Understanding Human Activities
- Leveraging Open Source Information
- Putting GEOINT in the Hands of the User
- Anticipatory GEOINT and Intelligence

Call for Deep-Dive Discussion Topics

NGA is soliciting topics for in-depth round table research discussions in the afternoon session.

For more information on how to submit topics, visit www.asprs.org/a/Sacramento_2012/NGA_Call_5_Dec2012.pdf.

Important Registration and Clearance Information for all Participants:

All attendees and speakers for the classified session must be pre-registered with ASPRS by February 24, 2012 (http://www.asprs.org/Registration/Sacramento-2012-Registration.html). Acceptance of paper or topic does not register you for the conference.

Attendees and speakers must have their security office submit clearance certification by March 2, 2012. Attendees must possess a minimum SECRET clearance to attend. Clearances may be passed to Northrop Grumman Information Systems by either of the following:

JPAS: (Preferred method)
Our cage code: 8X374* (We have two levels. By using the *, it covers both)
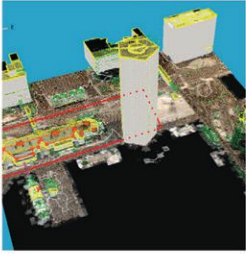POC: Margy Catalan/Ellen Bertuccelli
Reference: NGA/ASPRS meeting 3/19/2012

Or by fax:
916-570-4311
Attn: Margy Catalan/Ellen Bertuccelli
Reference: NGA/ASPRS meeting 3/19/2012

The world around us is not flat. You often need a solution that allows you to get information from more than just two dimensional imagery and data. Introducing E3De™, an interactive geospatial software environment that allows you to extract important situational awareness from three dimensional data – providing you with more information about an area of interest than ever before. E3De has advanced tools to utilize raw LiDAR point cloud data and create photorealistic 3D visualizations, extract 3D features from a scene, or produce 3D products and layers. Derived results can be included in your GIS, fused with 2D data for further analysis, and more. When you analyze the world in all three dimensions, you discover the full potential of your data and can make better, more informed decisions. Learn more at **www.exelisvis.com/E3De.**

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EXELIS

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REGISTRATION DESK HOURS
7:00 am to 5:45 pm

POSTERS OPEN
7:00 am to 7:00 pm

OPENING SESSION

KEYNOTE ADDRESS — 8:00 AM TO 9:00 AM

TERAPIXELS FOR EVERYONE: LIFE IN THE AGE OF MASSIVE IMAGE DATASETS
Dave Thau, *Google Earth*

We live in an age of massive image datasets; prodigious spatially (e.g. global), temporally (e.g. spanning decades), and physically (e.g. consuming petabytes of storage). The ability to store, manage, and process these data has typically been the domain of large institutions.

Happily, tools to create, access, and process large image datasets are becoming increasingly available to the general public.

This talk will survey recent advances in the democratization of large image datasets, discussing technical challenges, and highlighting the qualitatively different types of analyses that are possible when individuals have terapixels at their fingertips.

Dr. Dave Thau is the senior developer advocate for Google Earth Engine, Google's satellite image processing platform. He joined Google in 2010, bringing with him 20 years of industry experience developing Internet-based applications. Dave has created and managed software development for Webby Award winning websites, launched two successful startups, written a best-selling computer science textbook that has been translated into seven languages and published scholarly papers in the field of data management. His work has been mentioned in *Newsweek*, *Science*, *Nature*, *USA Today*, *The Economist*, *Rolling Stone* and *Wired*.

Over the past ten years, Dave has worked with image databases and geospatial systems, focusing on the fields of ecology and biodiversity. He currently works with scientists and NGOs (non-government organizations) developing software and algorithms to run on Google's highly parallelized cloud computing image processing framework.

Dave holds degrees from the University of California, Los Angeles, the University of Michigan, Ann Arbor, and a doctorate in computer science from the University of California, Davis.

TECHNICAL SESSIONS — 9:15 AM TO 10:45 AM

Airborne and Terrestrial Lidar #1
Moderator: Jamie Young, *Aero-Metric, Inc*

Probabilistic Line-of-Sight with Lidar Point Clouds
Peter Guth, *U.S. Naval Academy*

Airborne and Terrestrial Lidar in Education: Advanced Training for New Technologies
Thomas Jordan, *Center for Remote Sensing and Mapping Science*

Calibrating the MS Kinect Sensor
Charles Toth, *The Ohio State University*

QA/QC Assessing Qualitative and Quantitative aspects of Lidar Data
Jamie Young, *Aero-Metric, Inc*

Object-based Image Analysis #1
Moderator: Aaron Smith, *Ducks Unlimited Inc.*

Object-based Classification of Vegetation along the Lower Colorado River
W. B. (Pete) Clapham, *Cleveland State University*

Landscape Analysis of Wetland Plant Functional Types: The Effects of Spatial Scale, Vegetation Classes and Classifier Methods
Iryna Dronova, ESPM, *University of California - Berkeley*

An Object-based Data-fusion Approach to Impervious Surface Mapping
David Saah, *University of Vermont*

Updating the National Wetland Inventory in Minnesota by Integrating Air Photo-interpretation, Object-oriented Image Analysis and Multi-source Data Fusion
Aaron Smith, *Ducks Unlimited Inc.*

LiDARscapes and OBIA
Thomas Blaschke, *University of Salzburg*, Austria

* Co-authors will be listed in the final program

High Resolution Satellite Imagery
Moderator: Jennifer Nix, *DigitalGlobe Inc.*

Measuring Sand Flux on Mars using HiRISE Imagery
Francois Ayoub, *California Institute of Technology*

Using High-resolution Satellite Imagery to Assess Disturbance from Logging and Mining in the Rupununi, Guyana
Anthony Cummings, *Syracuse University*

improvement in the Detection of Land Cover Classes using the WorldView-2 Imagery
Ahmed Elsharkawy, *University of Calgary*, Canada

Invasive Species
Moderator: Caitlin Lippitt, *San Diego State University*

Using Public Domain Remotely Sensed Data to Predict *Taeniatherum Caput-Medusae* (Medusahead) Infestations: A Case Study from the Central California Foothills
Jim Alford, *California Department of Fish and Game, Vegetation Classification and Mapping Program*

An Automated Object-Based Analysis of Sirex Infestation in Pines
Nishan Bhattarai, *State University of New York - ESF*

Mapping Nonnative Herbaceous Cover in Shrubland Habitats: A Spectral-temporal Mixture Analysis Approach
Caitlin Lippitt, *San Diego State University*

A Bird's Eye View: Tracking the Progress of the Invasive Species Glossy Buckthorn (*Rhamnus Alnus*) Using Landsat Imagery
Kirk Zmijewski, *University of Toledo*

Cloud Special Session
Moderator: TBD

Geospatial Data and Imagery in the Cloud
Mark Tukman, *Tukman Geospatial LLC*

Education
Moderator: Nathan Jennings, *American River College*

Using Opticks Open Source Remote Sensing and Digital Image Processing Software in a Community College GIS Program
Nathan Jennings, *American River College*

Inquiry-Based Learning in Remote Sensing: A Space Balloon Educational Experiment
Giorgos Mountrakis, *State University of New York - ESF*

Hyperspectral Remote Sensing #1
Moderator: Mike Alonzo, *University of California - Santa Barbara*

Fusing Imaging Spectroscopy and Lidar to Discriminate Plant Functional Types in Urban Areas
Mike Alonzo, *University of California - Santa Barbara*

Estimating Forest Biophysical Parameters in Spatially Heterogeneous Urban-rural Landscape Gradient using Hyperion and Landsat Images
Jaya Anne, *University of Florida*

Supervised Learning with Hyperspetral Data
Soumyadip Chandra, *Indian Institute of Technology Kanpur*, India

Comparison of Hyperspectral Data and Worldview 2 Image to Detect the Impervious Surface Over Kuala Lumpur
Ebrahim Taherzadeh, *Institute of Advanced Technology (ITMA)*, Malaysia

Urban Applications #1
Moderator: Bingqing Liang, *University of Northern Iowa*

Image Server to Display High Resolution Satellite Images for Local Planning in the Greek Island of Naxos
John Hatzopoulos, *University of the Aegean*, Greece

Measuring the Urban Landscape of Indianapolis, USA by Using Spatial Metrics
Bingqing Liang, *University of Northern Iowa*

Urban Growth Modeling using Fuzzy Logic
Ehsan Foroutan, *University of Tehran*, Iran

NGA Special Session I — New Frontiers in GEOINT Analytics

This session will address ongoing basic and applied research that is relevant to NGA mission needs.

Special Session: GIScience Staff Recruitment and Geospatial Competency
Sponsored by the ASPRS Education and Professional Development Committee and the ASPRS Student Advisory Council

The goals of this panel session are to determine, in the near future, what are the GIScience staff recruiting needs, the technical/educational skills of these needed individuals, and the areas in which recruitment has been challenging. In addition, each of the panelists will comment on their use (or lack of) of the Geospatial Competency model in their recruitment goals. The panelists will include representatives from federal government and industry.

* Co-authors will be listed in the final program

Oral Poster Presentations I — 9:15 am to 10:45 am

Oral Poster Presentation I
Moderator: Lloyd Blackburn,

Back by Popular Demand – Oral Poster Presentation Sessions! In addition to the technical paper presentations on Wednesday, March 21st, Poster Presenters will also be discussing their information via oral presentations. Take this opportunity to hear directly from the Poster Presenters in a technical session environment. Each presenter will discuss their research, development and the hard work that they have done over the past year in order to prepare their poster. The physical posters will be on display from Wednesday, March 21st at 7:00 am until Friday, March 23rd at 11:00 am. *All Poster Presenters are asked to be near their physical posters specifically during the Exhibitors' Reception on Wednesday, March 21st from 5:30 pm until 7:00 pm.* **All currently accepted posters are listed on page 41 of this program.**

Exhibits & Breaks

Exhibit Hall Opens
10:00 am to 7:00 pm

Beverage Break
10:45 am to 11:00 am

Take a break! Use this time to visit with the Exhibitors and grab a beverage in the exhibit hall. All attendees are welcome, complimentary beverages provided.

Technical Session — 11:00 am to 12:00 Noon

NGA Special Session II — Round Table Discussions: New Frontiers in GEOINT Analytics
This session will address ongoing basic and applied research that is relevant to NGA mission needs.

23rd Annual Awards Luncheon & 78th Installation of ASPRS Officers
Wednesday, March 21st, 12:15 pm to 1:30 pm

Join your colleagues at this year's luncheon on Wednesday, March 21st, to honor current award recipients and participate in the installation of the 78th Slate of ASPRS Officers.

The award winners will be given special honor and the annual business meeting of the Society will include installation of the new ASPRS Officers. To conclude the year, Gary Florence, retiring ASPRS President, will give a summation of the past year's events.

Tickets for this Luncheon are required and are separate from the conference registration. Tickets may be purchased by completing the information on the Conference registration form found on page 45-46 of this program. Cost is $55 per person.

On site ticket purchases are limited to availability.
Limited seating in the rear of the room is available at no cost for conference registrants wishing to attend the ceremonies only.

HOT TOPICS

Interactive Networking

Wednesday, March 21, 11:00 am to 12:00 Noon

These one-hour HOT TOPIC discussion groups, hosted by ASPRS Divisions and Committees, are a high point of every conference. This is an opportunity for all attendees to weigh in with their thoughts on the issues being discussed and network with your peers.

PROCUREMENT – The Rules of the Game – Are They Changing?
Hosted by the ASPRS Professional Practice Division

The "game" of government procurement of geospatial products and services is guided by rules, regulations, and best-practices, but the rules of the game are confusing and much procurement in today's marketplace seems to "break the rules". This session will encourage participation from all sides of the issue – private sector mapping firms, geospatial product providers, federal government contracting officers, state and local employees who contract for mapping products and services, and ASPRS / MAPPS / COGO organizational representatives.

ASPRS has developed new guidelines for the procurement of geospatial products which will serve as a companion document to the recently-adopted guideline for the procurement of geospatial services. This session will explore how geospatial products are differentiated from professional services and raise the question, "Will this new guideline make a significant change to the rules of the game"?

The Future of Operational Land Imaging
Hosted by the U.S. Geological Survey

ASPRS strongly supports the Department of the Interior (DOI) management of the Landsat Program, dating from October 2000, and proposed DOI leadership and implementation of a national operational land imaging capability, which would include Landsat. During this hot-topic session, the USGS will lead a discussion on current and near-term Landsat Program highlights and the future of U.S. land imaging.

Accuracy Issues in Specifying and Validating Digital Imagery Products and Sensors (Geometry, Spatial Resolution and Radiometry)
Hosted jointly by the ASPRS Photogrammetric Applications and Primary Data Acquisition Divisions

The issues and trends for specifying and verifying digital imagery accuracy will be discussed in a round table forum. Topics to be included are geometry, spatial resolution and radiometry.

Issues Relating to Lidar and the LAS Specifications
Hosted by the NEW ASPRS Lidar Division

Phase VI of the ASPRS 10-Year Remote Sensing Industry Forecast

Charles Mondello, project team chair, will be on hand to discuss the highlights of the latest survey information and what it projects as the future of the remote sensing industry.

ASPRS Task Force on Branding
Hosted by the ASPRS Executive Committee

HAVE YOUR VOICE HEARD! Imagine a clean white board. Brainstorm energizing ideas for a professional society focused on "imaging and geospatial information science and technology." What would you write on that board about its goals, organization, roles, relevancy? Come prepared to discuss your ideas with the ASPRS Task Force on Branding and to review more details from its surveys.

Modernization Program of the North American Reference Frame

GNSS Accuracy, Status, and Future Development

Oral Poster Presentation II

Moderator: Lloyd Blackburn,

Back by Popular Demand – Oral Poster Presentation Sessions! In addition to the technical paper presentations on Wednesday, March 21st, Poster Presenters will also be discussing their information via oral presentations. Take this opportunity to hear directly from the Poster Presenters in a technical session environment. Each presenter will discuss their research, development and the hard work that they have done over the past year in order to prepare their poster. The physical posters will be on display from Wednesday, March 21st at 7:00 am until Friday, March 23rd at 11:00 am. *All Poster Presenters are asked to be near their physical posters specifically during the Exhibitors' Reception on Wednesday, March 21st from 5:30 pm until 7:00 pm.* **All currently accepted posters are listed on page 41 of this program.**

Technical Sessions — 1:30 pm to 3:00 pm

Airborne and Terrestrial Lidar #2
Moderator: Greg Snyder, *U.S. Geological Survey*

Using Airborne Lidar Data for Improving the Coverage and Accuracy of Terrestrial Laser Scans for Digital Terrain Modeling
Nancy Glenn, *Idaho State University*

Segmentation-based Classification of 3D Laser Data
Zahra Lari, *University of Calgary*, Canada

National Enhanced Elevation Assessment: The California Requirement
Carol Ostergren, *U.S. Geological Survey*

Results of the National Enhanced Elevation Requirements and Benefits Assessment
Greg Snyder, *U.S. Geological Survey*

Object-based Image Analysis #2
Moderator: Bahram Salehi, *University of Calgary*, Canada

Quantifying Urban Waste Heat with Shape and Tir Metrics Defined using Geobia to Promote Energy Efficiency and Low Carbon Communities
Bharanidharan Hemachandran, *University of Calgary*, Canada

Object Based Mosaicing (OBM) of High-resolution Thermal Airborne Imagery to Minimize the Geometric Distortion of Roof-top/House Objects
Mir Mustafizur Rahman, *University of Calgary*, Canada

Object-based Moving Vehicle Extraction from WorldView2 Imagery
Bahram Salehi, *University of Calgary*, Canada

Building Outlining from Dense Matching Points Generated from Multi-view Oblique Images
Jing Xiao, *University of Twente*, the Netherlands

Climate Change
Moderator: Kerri Crowder, *University of Alaska - Fairbanks*

Time-series Analysis of Trident Glacier Using Satellite Imagery and Historic Aerial Photography
Kerri Crowder, *University of Alaska - Fairbanks*

Cal-Adapt: Bringing Global Climate Change to a Local Application
Kevin Koy, *University of California - Berkeley*

Using the Terrestrial Observation and Prediction System (TOPS) to Analyze Impacts of Climate Change on California Ecosystems
Katherine Pitts, *NASA Ames DEVELOP Program*

A Decision Support System for Monitoring, Reporting and Forecasting Ecological Conditions of the Appalachian Trail Lands
Yeqiao Wang, *University of Rhode Island*

Wildlife
Moderator: Anthony Cummings, *Syracuse University*

A Hotspot Analysis of Deer-vehicle Collisions in the Eastern Sierra Nevada
Shasta Ferranto, *University of California - Berkeley*

GOES Early Fire Detection (GOES-EFD) System Prototype
Alexander Koltunov, *University of California - Davis*

Spectral Characteristics of Domestic and Wild Mammals
Pat Terletzky-Gese, *Utah State University*

The Vegetation of the Rupununi: A Classification from the Perspective of Amerindian Hunters
Anthony Cummings, *Syracuse University*

Mapping Landscape Phenology Preference of Yellow-billed Cuckoo with AVHRR Data
Cynthia S.A. Wallace, *U.S. Geological Survey*

Cloud Computing #2
Moderator: Shawana Johnson, *Global Marketing Insights, Inc.*

Commercial Cloud Computing and Near Real-time Data Exploitation
Shawana Johnson, *Global Marketing Insights, Inc.*

Ortho Production Status and QC in the Cloud Environment
Bob Ryan, *URS Corporation*

A Cloud-Computing Framework for Point Cloud Editing
Fengliang Xu, *ERDAS*

* Co-authors will be listed in the final program

NGA Special Session III: New Frontiers in Characterizing and Understanding Human Geography

This session will address ongoing basic and applied research that is relevant to NGA mission needs.

Special Session: K-12 Geo-spatial Technology Education

Moderator: Cindy Clark, *State of Utah, AGRC*

Building the Geospatial Education Pipeline, "How it's Done in Utah"
Cindy Clark, *State of Utah, AGRC*

Urban Applications #2

Moderator: Nathan Jennings, *City of Sacramento*

Remote Sensing of Transportation Infrastructure: Bridges and Unpaved Roads
Colin Brooks, *Michigan Technological University - MTRI*

Business Systems Integration of GIS, Web, and Work Order Management Systems: A Case Study
Nathan Jennings, *City of Sacramento*

Utilizing Geospatial Technologies to Detect and Monitor Foreign Objects and Debris on Airport Runways and Vicinities
Frederick Wilson, *Morgan State University*

Special Session: Academic Publishing

Sponsored by the ASPRS Student Advisory Council
Moderator: Leanne Sulewski, *Univ. of South Carolina*

This session will provide graduate students and young professionals an introduction to the peer review publication process. Details will be presented on the proper organization, preparation and submission of a manuscript. This session will also provide insight on how to choose an appropriate journal, draft a letter to the editor, and address reviewer comments. Students will learn what to expect during all steps of the publication process.

Panelists:
Russell Congalton – Editor-in-Chief, *PE&RS*
Jie Shan – Assistant Editor, *PE&RS*
John Jensen – Editor-in-Chief, *GISciences and Remote Sensing*

BEVERAGE BREAK — 3:00 PM TO 3:30 PM

Take a break! Use this time to visit with the Exhibitors and grab a beverage in the exhibit hall. All attendees are welcome, complimentary beverages provided.

TECHNICAL SESSIONS — 3:30 PM TO 5:00 PM

Airborne and Terrestrial Lidar #3
Moderator: Mahesh Rao, *Humboldt State University*

High-resolution Airborne Green Lidar Bathymetry: First Test Results
Craig Glennie, *University of Houston*

The Full-waveform Lidar Riegl LMS-Q680i: From Reverse Engineering to Sensor Modeling
Andre Jalobeanu, *CGE / University of Evora*, Portugal

Evaluation of Lidar-based Mapping of Serpentine Soils in the Lassen and Plumas National Forests
Mahesh Rao, *Humboldt State University*

Terrestrial Lidar for Oil and Gas
Jan Van Sickle, *Downtown Design Services, Inc. (DDSI)*

Object-based Image Analysis #3
Moderator: Brian Kloer, *ERDAS*

Empirical Distribution Analysis (EDA)-based Object Classification
Brian Kloer, *Intergraph*

Who Does What Where? Advanced Earth Observation for Humanitarian Relief Coordination
Chandi Witharana, *University of Connecticut*

Object-oriented Change Detection with Discriminant Function
Brian Kloer, *Intergraph*

* Co-authors will be listed in the final program

Special Session: Change Detection
Sponsored by the ASPRS Remote Sensing Applications Division
Moderator: Chad Lopez, *Photo Science, Inc.*

Histogram Comparison Method (HCM) to Monitor Changes in Riparian Vegetation after a Drilling Event in the Big Springs Mining Area, Nevada: An Alternative to Traditional Change Detection Procedure
Tanushree Biswas, *Remote Sensing Application Center*

The Changing California Coast: The Effect of a Variable Water Budget on Coastal Vegetation Succession
Adam McClure, *NASA Ames DEVELOP Program*

Producing the 2010 NOAA Coastal Change Analysis Program Land Cover Update
Chad Lopez, *Photo Science, Inc.*

Using MODIS Data to Monitor Post-fire Re-vegetation Efforts in the Great Basin: Milford Flat Fire, Utah
Lisa Stoner, *Utah State University*

Special Session: National Park Service
Moderator: Kenneth Stumpf, *Geographic Resource Solutions*

NPS Vegetation Inventory and Mapping
Karl Brown, *National Park Service*

The Lassen Volcanic National Park Comparative Mapping Project - Initial Results
Kenneth Stumpf, *Geographic Resource Solutions*

TECHNICAL SESSIONS — 3:30 PM TO 5:00 PM

NGA Special Session IV: Round Table Discussions: New Frontiers in Characterizing and Understanding Human Geography

This session will address ongoing basic and applied research that is relevant to NGA mission needs.

Accuracy/Error #1: Instruments
Moderator: Joshua France, *Rieg*

Automated Calibration (AutoCal)
Roberto Canavosio-Zuzelski, *National Geospatial-Intelligence Agency*

Mobile System Angular Alignment Quality Analysis
Joshua France, *Riegl USA*

Close Range Photogrammetric Mapping of Sea Waves for Better Harbor Design
John Hatzopoulos, *University of the Aegean*, Greece

Pushbroom Aerial Imagery Scanner Mapping Accuracy Put to the Test
Mike Tully, *Aerial Services, Inc.*

Education: Online GIS Graduate Programs
Moderator: Ming-Chih Hung, *Northwest Missouri State University*

Panelists:
Patricia Drews, *Northwest Missouri State University*
Anthony Robinson, *The Pennsylvania State University*
Paul Sutton, *University of Denver*
John Wilson, *University of Southern California*

ASCE Geomatics for Sustainability Subcommittee
Moderator: Carolyn Merry, *The Ohio State University*

How Geospatial Technologies can be used to Address Sustainability in Civil Engineering
Carolyn Merry, *The Ohio State University*

Sensor Innovations for Data Delivery from UAS Platforms: The NASA Ikhana Experience
Vincent Ambrosia, *California State University - Monterey Bay*

U.S. Geological Survey Unmanned Aerial Systems Project Office
Michael Hutt, *U.S. Geological Survey*

Special Session: UAS Imaging Systems/Data Processing
Sponsored by the ASPRS Primary Data Acquisition Division
Moderator: Lawrence Handley, *U.S. Geological Survey's National Wetlands Research Center (NWRC)*

Accessing Airspace for UAS Flights in Support of NASA Science
Brenda Mulac, *NASA – Goddard Space Flight Center*

New Multipurpose Remote Sensing Systems for Rapid Disturbance Mapping
Thomas Zajkowski, *U.S. Forest Service Remote Sensing Applications Center (RSAC)*

ORAL POSTER PRESENTATION III — 3:30 PM TO 5:00 PM

Oral Poster Presentation III
Moderator: Lloyd Blackburn,

Back by Popular Demand – Oral Poster Presentation Sessions! In addition to the technical paper presentations on Wednesday, March 21st, Poster Presenters will also be discussing their information via oral presentations. Take this opportunity to hear directly from the Poster Presenters in a technical session environment. Each presenter will discuss their research, development and the hard work that they have done over the past year in order to prepare their poster. The physical posters will be on display from Wednesday, March 21st at 7:00 am until Friday, March 23rd at 11:00 am. *All Poster Presenters are asked to be near their physical posters specifically during the Exhibitors' Reception on Wednesday, March 21st from 5:30 pm until 7:00 pm.* **All currently accepted posters are listed on page 41 of this program.**

EXHIBITORS' WELCOME RECEPTION — 5:30 PM TO 7:00 PM

A wonderful occasion to visit with both national and international suppliers and an Annual ASPRS Conference tradition is the Exhibitors' Reception. Mingle with the Conference Exhibitors', our hosts for the evening, in a relaxed environment and take some time to form lasting professional relationships.

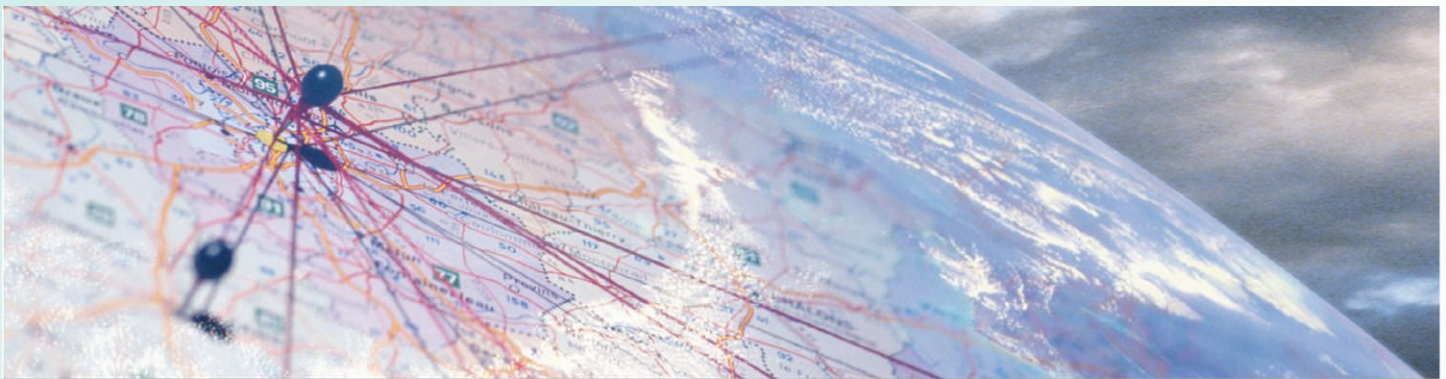Light hors d'oeuvres and beverages will be served while you come together with old and new friends.

Admission to this event is included with most registrations.

* Co-authors will be listed in the final program

EXHIBITORS

The ASPRS 2012 Annual Conference, taking place in Sacramento, California, March 19 - 23, 2012 will offer a fascinating program filled with technical sessions, keynote speakers, workshops and more, all focused on what is to come for the imaging and geospatial industry. Geospatial professionals in academia, government and private industry are sure to be in attendance. Don't miss this great opportunity to highlight your company at the premier industry event. For more information on exhibiting, visit http://www.asprs.org/Annual-Conferences/Exhibitors-Sponsors/.

Airborne 1 Corporation	GeoDigital International	Optech Incorporated
ASD Inc.	HAS Images, Inc.	Overwatch
BAE Systems	ITRES Research Limited	PCI Geomatics
Cardinal Systems, LLC	ITT Visual Information Solutions	RapidEye AG
DAT/EM Systems International	IXSEA, France	Riegl USA Inc.
DMC International Imaging Ltd.	KLT Associates Inc.	Topcon Positioning Systems, Inc.
Dynamic Aviation	Leica Geosystems Inc.	Trimble
Earth Eye	Microsoft Corporation	U.S. Geological Survey (USGS)
ERDAS, Inc.	New Tech Services, Inc.	VISIONMAP
Esri	NovAtel Inc.	Visual Intelligence
GeoCue Corporation		

REGISTRATION DESK OPEN
7:00 am to 5:00 pm

PRESIDENT'S ADDRESS/GENERAL SESSION

INCOMING PRESIDENT'S ADDRESS — 8:00 AM TO 9:00 AM

WORKING TOGETHER
Roberta (Bobbi) Lenczowski, *ASPRS President*
8:00 am to 9:00 am

Among the many quotes attributed to Henry Ford is: *"Coming together is a beginning. Keeping together is progress. Working together is success."* **I expect members of this organization to remind me of those words frequently during the coming year.** Over three decades ago, I was a novice photogrammetrist, newly employed by the Defense Mapping Agency in St. Louis. As with today's emerging professionals, on-the-job experience, additional education, judicious mentoring, and professional networking laid the foundation for an exciting and rewarding career no one might have envisioned during those first challenging weeks and leading to today's events. As I accept the office of President at the ASPRS annual meeting here in Sacramento, I am reminded of the professional significance of those who have preceded me in this position, successfully building the reputation of a Society that is both relevant and resilient. During this presentation, I plan to share with you the many insights that our Task Force on Branding garnered from a series of surveys over the past several months. The Task Force was insightfully chartered by then-incoming president, Gary Florence, during our last spring conference in Milwaukee, to assess the state of our Society and to seek membership's ideas for improvements. Some changes are already underway to strengthen our professional stature, to reinforce the disciplines we cherish, and to educate decision makers. ASPRS is our professional organization and it is our future that we will shape together.

Roberta (Bobbi) Lenczowski is an independant geospatial information-intelligence consultant. In addition, she is outside Board Director for TechniGraphics, GeoEye, Fugro EarthData Inc, and the non-profit Leonard Wood Institute, and supports the Academic Advisory Group of Sanborn.

Lenczowski retired, with 28 years of federal service, from the National Geospatial Intelligence Agency (NGA) in 2005, as executive director of the St. Louis operations. During her tenure in Washington, D.C., Lenczowski served three years as NGA's Technical Executive. Prior to that, she was director of Operations with the National Imagery and Mapping Agency (NIMA).

Lenczowski has served on several national advisory groups and study teams. In the 90s, she represented DOD on the Board of the National Center for Geographic Information and Analysis. During the last five years of her federal career, she represented NGA on the National Oceanic and Atmospheric Administration's Advisory Committee on Commercial Remote Sensing; the Department of Interior's National Satellite Land Remote Sensing Data Archive Advisory Committee; and, the Security Affairs Support Association.

Lenczowski recently completed her second term in two decades as president of the ASPRS St. Louis Region. She is an Advisory Board member for the St. Louis Chapter of the National Defense Industrial Association, and an individual member of the U.S. Geospatial Intelligence Foundation.

GENERAL SESSION

A GEOSPATIAL ULTIMATUM FOR THE FUTURE: SAVING LIVES REQUIRES A RAPID SYNOPTIC OVERVIEW OF EFFECTS AND DAMAGE
Kenneth W. Hudnut, *U.S. Geological Survey*

Kenneth W. Hudnut applies new technologies such as GPS and LiDAR to earthquake research as a geophysicist for the USGS in Pasadena, California. For significant earthquakes in Southern California, he directs USGS response operations and research. He represents the Southern California region, which has half of the Nation's earthquake risk, on the U. S. Earthquake Hazards Program Council and serves on the Board of Directors for the Southern California Earthquake Center. He chairs the steering committee of the California Integrated Seismic Network and led the GPS L1C signal design project. He received his Ph.D. from Columbia in 1989, and his A.B. (high honors) from Dartmouth in 1983. He is a Visiting Associate in Geophysics on the faculty of the California Institute of Technology.

Lidar and Forests #1
Moderator: Maggi Kelly, *University of California - Berkeley*

Object-based Image Analysis of Downed Logs in Disturbed Forested Landscapes using Lidar
Samuel Blanchard, *University of California - Berkeley*

Lidar and Forest Visualization
Jacob Flanagan, *University of California - Merced*

Predicting Surface Fuel Models and Fuel Metrics using Lidar and Imagery in Dense, Mountainous Forest
Marek Jakubowski, *University of California - Berkeley*

Seeing Trees from the Lidar Point Cloud
Wenkai Li, *University of California - Merced*

An Analysis on the Use of Allometric Equations on the Regression Modeling of Biomass: A Case Study in Sierra National Forest, CA
Feng Zhao, *University of California - Berkeley*

Time-sensitive Remote Sensing for Disaster Response #1
Moderator: Michael Hodgson, *University of South Carolina*

Automated Co-registration of Multi-temporal Airborne Frame Images for Rapid Change Detection
Lloyd Coulter, *San Diego State University*

Rapid Generation of Image-based Products to Support Disaster Response: A Review of Distributed Processing Techniques Used by FEMA During Recent Tornado Incidents
Bruce Davis, *Dept. of Homeland Security, Science and Technology*

Time-sensitive Remote Sensing: Considerations for the Use of Remote Sensing to Collect Time-sensitive Information
Christopher Lippitt, *San Diego State University*

Detection of Earthquake Damage to Critical Infrastructure with Flexible, Repeat-pass Imaging
Douglas Stow, *San Diego State University*

Hyperspectral Remote Sensing #2
Moderator: Stanley Grossman, *George Mason University*

A Novel Hypespectral Imager using Advanced Microslice Technologies
Daniel Donoghue, *Durham University*

Spectral Image Based Small Target Recognition
Stanley Grossman, *George Mason University*

International Space Station Agricultural Camera (ISSACTM) Sensor Onboard the International Space Station (ISS): Sensor Characterization and On-Orbit Imaging Performance
Ho Jin Kim, *University of North Dakota*

Hyperspectral Water Productivity Models and Maps of Some Leading World Agricultural Crops for Ensuring Food Security
Isabella Mariotto, *U.S. Geological Survey*

Wetlands
Moderator: Prasad Thenkabail, *U.S. Geological Survey*

Modeling Changes in Tidal Wetland Distributions in the San Francisco Bay Estuary with Sea-level Rise
Lisa Schile, *University of California - Berkeley*

Assessing the Spatial Distribution of Wetland Hydroperiod and Vegetation Community using Lidar
Nilam Kayastha, *Virginia Tech*

Imagery Interpretation for Coastal and Marine Spatial Planning
George McLeod, *Old Dominion University*

Hyperspectral Mapping of the Invasive Species Pepperweed and the Development of a Habitat Suitability Model
Glade Dlott, *NASA Ames DEVELOP Program*

Selecting Areas of Wetland Cultivation and Preservation in Africa: Satellite Sensor Data Fusion Synthesized with Socio-economic Data in a Spatial Modeling Framework to Support Africas Green and Blue Revolution
Prasad Thenkabail, *U.S. Geological Survey*

Accuracy/Error Assessment #2: Reporting Error
Moderator: David Alvarez, *Fluor-B&W Portsmouth, LLC*

The Impact of Scale on the Accuracy of Landcover Polygons
Gred McDermid, *University of Calgary, Canada*

Practical View of Large Scale Mapping: How Accurate is it?
Neil King, *Photo Science, Inc.*

Developing Confidence Metrics for Training Dataset Selection in Remote Sensing Classification
Giorgos Mountrakis, *State University of New York - ESF*

Vanishing Point Geometry and Relative Measurement Uncertainty Estimation for Close Range Images
Hank Theiss, *NGA*

Analytical Results for Non-Image Based Void Fill Accuracy Prediction
Harlan Yates, *Harris Corporation*

Special Session: Jobs in the Federal Government: Writing and Preparing KSA
Organized by the ASPRS Student Advisory Council
Moderator: Leanne Sulewski, *Univ. of South Carolina*

This session will provide opportunities for graduate and undergraduate students to learn about applying for federal jobs. Topics to be covered include: finding jobs in the federal government, applying for jobs in the federal government, and writing and preparing knowledge, skills, and abilities essays.

Panelists:
Kari Craun, *U.S. Geological Survey*

* Co-authors will be listed in the final program

Surface Models #1

Moderator: Charles Toth, *The Ohio State University*

Using Digital Bridge Model to Improve Orthophoto Generation
Hui Ju, *The Ohio State University*

Latest Results of Lunar Topographic Mapping using LROC NAC Stereo Images and OSU OrbiterMapper
Rongxing Li, *The Ohio State University*

Contrast Invariant and Affine Optical Flow for DEM Extraction
Neus Sabater, *Caltech*

Pattern Recognition

Moderator: Biplab Banerjee, *IIT Bombay, India*

Pixel Clustering using Latent Dirichlet Allocation on Hyperspectral Image
Kyoungjin Park, *The Ohio State University*

Ocean Surface Currents from SAR
Waqas Qazi, *University of Colorado - Boulder*

Extraction and Analysis of Remotely Sensed Urban Heat Islands using Data Mining Techniques
Qihao Weng, *Indiana State University*

Pixel Classification of Satellite Images using a Novel Pairwise Kernel Function
Biplab Banerjee, *IIT Bombay, India*

Special Session: Sensor Calibration and Data Product Validation

Sponsored by the Primary Data Acquisition Division
Moderator: Andrea Laliberte, *USDA ARS Jornada Experimental Range*

Geopositional Data Accuracy: Metrics and Assessments
Qassim Abdullah, *Fugro EarthData, Inc.*

Multispectral Remote Sensing from Unmanned Aircraft: Development of Workflows and Comparison with WorldView-2 Data
Andrea Laliberte, *USDA ARS Jornada Experimental Range*

Digital Imagery Spatial Resolution and Radiometry: Metrics and Assessments
Mary Pagnutti, *URS Corporation*

USGS Data Product and Sensor Calibration Activities
Greg Stensaas, *U.S. Geological Survey – EROS*

NGA Special Session V: Computational Geo-Analytics

This session will address ongoing basic and applied research that is relevant to NGA mission needs.

* Co-authors will be listed in the final program

Beverage Break — 10:45 am to 11:00 am

Take a break! Use this time to visit with the Exhibitors and grab a beverage in the exhibit hall. All attendees are welcome, complimentary beverages provided.

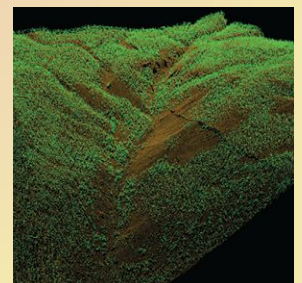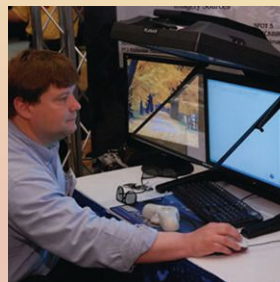## COMMERCIAL SESSIONS — 11:00 AM TO 12:00 NOON

Cloud Computing
Moderator: Clinton Libbey

Geospatial Processing in Google's Cloud
Sean Maday, *Google Inc.*

Accelerating GeoImage Processing on the Cloud
David Piekny, *PCI Geomatics*, Canada

Surface Mapping
Moderator: Sally Gehr, *Aero-Metric, Inc.*

Application Review of High-Resolution Airborne Lidar Data and Thermal Imagery
Glenn Farrington, *Optech Incorporated*, Canada

The Difference between High Resolution and Highest Resolution Thermal Mapping
Ray Watts, *Jenoptik - IR*

Photoshop is Another Image Enhancement Tool
Sally Gehr, *Aero-Metric, Inc.*

Towards Improved Digital Surface Model Extraction for Digital Orthophoto Production
Tobias Heuchel, *Trimble Germany GmbH*, Germany

Aerial Imaging
Moderator: Michael Joos, *GeoCue Corporation*

Iris One™ Stereo System
Juwon Hwangbo, *Visual Intelligence*

The Value of Earned Value Management
Michael Joos, *GeoCue Corporation*

Automating Quality Control for Aerial Mapping using Dense Point Clouds
Robert Uebbing, *North West Geomatics*, Canada

New Sensor Technology
Moderator: Michael Gruber, *Microsoft*, Austria

Ultracam Eagle, Understanding the New Sensor
Michael Gruber, *Microsoft*, Austria

The Power of Multi-Ray Photogrammetry - Ultramap 3.0
Alexander Wiechert, *Microsoft, Vexcel Imaging GmbH*, Austria

Mission Planning & Future Trends
Moderator: Steven Lambert, *Esri, Inc.*

Woolpert's Redline Viewer Eliminates the Red Tape
Jon Downey, *Woolpert Inc.*

Assured Mission Continuity
Drew Hopwood, *Astrium GEO-Information Services*

Optimization of Scene Selection for a New Global Image Map
Steven Lambert, *Esri, Inc.*

An Elastic, High Throughput Image Processing Pipeline in the Amazon Cloud
Steven Lambert, *Esri, Inc.*

TECHNICAL SESSION — 11:00 AM TO 12:00 NOON

NGA Special Session VI: NGA Academic and Industry Partnerships

This session will address ongoing basic and applied research that is relevant to NGA mission needs.

GeoLeague Challenge Presentations
Sponsored by the ASPRS Student Advisory Council

The group participating in this year's Challenge will give their presentations during this session. The presentations will be judged and prizes awarded at the Memorial Address.

* Co-authors will be listed in the final program

2012 Memorial Address

Thursday, March 22, 2012, 12:00 Noon to 1:30 pm

A special presentation will be given by Nick Moffitt honoring Frank Moffitt as the 2012 Memorial Addressee. Moffitt will be honored for his lifetime of accomplishments and service to the geospatial industry. Join us for this spectacular presentation followed by a luncheon.

HONOREE

Francis H. "Frank" Moffitt was born and raised in Cuyahoga Falls, Ohio, and spent his youth helping out on the family farm during the summers. He was fascinated with maps, and in high school became an avid member of the photography club. He joined the Army shortly after graduating from high school just prior to the attack on Pearl Harbor, and was selected to attend the Army Air Corps' photography school in Colorado. He spent the war years in the Panama Canal Zone as a photographer and working in the Army Air Corps photo lab processing aerial photos of the war in the Pacific. It was there that he realized he could combine his loves of photography and maps.

After his discharge from the Army Air Corps, Frank attended Syracuse University, where he had the good fortune to study under Earl Church and Al Quinn, with whom he maintained lifelong friendships. He taught at Syracuse for a short time after receiving his Master's Degree, until he was recruited by the University of California to create its Photogrammetry program at Berkeley. He joined the Berkeley faculty in 1951 and taught surveying, photogrammetry, and geodesy until he retired as emeritus professor in 1987. Over the years Frank taught many short courses in photogrammetry for practicing professionals, and with his U.C. colleague James Anderson developed a program to teach photogrammetry to California Department of Transportation engineers and surveyors.

Frank authored textbooks on surveying and photogrammetry that were used by many thousands of engineering, forestry and remote sensing students throughout the world. He was proud of his early work as a surveyor for the U.S. Geological Survey, Army Corps of Engineers, and National Park Service.

Frank joined the American Society of Photogrammetry as a student at Syracuse, and remained active throughout his career, serving as President of ASPRS in 1979. He was a National Director of the American Congress on Surveying and Mapping from 1967 to 1970, and President of Management Association for Private Photogrammetric Surveyors from 1986-1987. He was awarded Honorary Membership in ASPRS and the Northern California Section of ACSM.

PRESENTER

Nick Moffitt, eldest son of Frank Moffitt, will be presenting the Memorial Address. Nick Moffitt began his metrology career at the age of 5 as an unpaid assistant in his father's photogrammetry lab at U.C. Berkeley. Nick completed his "lab work" 20 years later when he received his B.S. and M.S. degrees in Civil Engineering from Berkeley, specializing in surveying and photogrammetry. He later attended Purdue University where he studied least-squares adjustments of surveying data before starting his career as a software developer, helping to create some of the earliest theodolite systems including Wild CAT2000, Kern ECDS, and Sokkia AccuNET. After a brief foray into the world of forensic photogrammetry where he analyzed photographic evidence in support of court proceedings, Nick returned to the field of large-scale metrology with SMX.

During nearly 10 years with SMX and later FARO, Nick served as Regional Sales Manager, Software Manager and Director of Product Management, where he worked on the team that designed what became the FARO Xi Tracker. Nick also worked at API and later Verisurf, where he helped both companies increase their market share. He recently joined Geomagic where he serves in a technical sales role.

Active in CMSC since 1986, Nick credits much of the success in his career to the relationships he has forged through the metrology community. His particular interests are in education, training and in mentoring a new generation of metrologists.

Nick lives in Washington's Puget Sound with his wife Nancy and daughter Leann, who is attending art school. The family enjoys numerous outdoor activities, and Nick is particularly passionate about fly-fishing and nature photography.

Lidar and Vegetation #1
Moderator: Ryan Sheridan, *Texas A&M University*

Multi-Temporal SAR Estimation of Biomass for Boreal Forests in Alaska
Don Atwood, *University of Alaska - Fairbanks*

Integration of Airborne Lidar and Vegetation Types Derived from Aerial Photography for Mapping Aboveground Live Biomass
Qi Chen, *University of Hawaii - Manoa*

Comparisons of Lidar and Multispectral Remote Sensing In Assessing Regional Scale Woody Plant Biomass
Nian-Wei Ku, *Texas A&M University*

Comparing Wetland Vegetation Structure Metrics using Green-Waveform and Discrete-return Lidar Data
Amar Nayegandhi, *Jacobs Technology*

Modeling FIA Plot-level Biomass and Volume using Airborne Lidar Measurements
Ryan Sheridan, *Texas A&M University*

Time-sensitive Remote Sensing for Disaster Response #2
Moderator: Bruce Davis, *Department of Homeland Security, Science and Technology*

A Survey of State/County EOCs Offices: Emerging Technologies to Enhance Rapid Data Collection, Distribution, and Response
Sarah Battersby, *University of South Carolina*

A Survey of State/County EOCs Offices: What and When do They Need Geospatial Data/Imagery in the Disaster Response?
Michael Hodgson, *University of South Carolina*

Improving the Use of Image Data for Disaster Response: A Discussion of the Real time Airborne Management System (RAMS)
Charles Mondello, *Pictometry*

Urban Mapping #1
Moderator: Lisa Erickson, *Photo Science Inc.*

Semi-automated Extraction of Building Rooftops and Urban Tree Canopy using Data Fusion of High-resolution Aerial Imagery and Lidar
Lisa Erickson, *Photo Science Inc.*

Fusion of Feature Selection and Optimized Immune Networks for Urban Classification
Jungho Im, *SUNY ESF*

Towards Fully Interpreted and Reconstructed Building Roofs by 3D Vision
Philipp Meixner, *Graz University of Technology*, Austria

Geospatial Mapping of Asthma and its Ecology in Karachi, Pakistan
Mohammed Mehdi, *NED University of Engineering*, Pakistan

Vegetation Mapping #1
Moderator: Prasad Thenkabail, *U.S. Geological Survey*

Landsat-based Land Cover Change Analysis in Northeastern Oregon's Timber-Resource-Dependent Communities
Michael J. Campbell, *University of New Hampshire*

Methods for Validating Tropical Deforestation
Daniel Donoghue, *Durham University*, UK

Canopy Pigment Concentration Estimation by Spaceborne Imaging Spectroscopy in a Boreal Forest
Kemal Gokkaya, *Virginia Tech*

Hyperspectral Remote Sensing of Vegetation: Knowledge Gain and Knowledge Gap after 40+ Years of Research
Prasad Thenkabail, *U.S. Geological Survey*

Predicting Soil Nitrogen Content using Narrow-band Indices from Eucalyptus Grandis Canopies as Proxy
Thamsanqa Nzinyane, *University of KwaZulu-Natal*, South Africa

Mobile Mapping #1
Moderator: Clive S. Fraser, *University of Melbourne*, Australia

Situational Awareness at the Tactical Edge: Delivering Critical Mobile Data to the Warfighter in Hard Environments
Zachary Bauer, *Integrity Applications, Inc.*

Improving Mobile Mapping Navigation Trajectory beneath Forest Canopy
Adam Benjamin, *University of Florida*

Urban Surveying using Mobile Mapping and its Related Complexities
Stephen Clancy, *Optech Incorporated*, Canada

Automatic Camera Calibration in Close-Range Photogrammetry
Clive S. Fraser, *University of Melbourne*, Australia

Accuracy/Error Assessment #3: Error Estimation
Moderator: Doug Olsen, *University of North Dakota*

Map Accuracy Assessment Issues When using an Object-oriented Approach
Meghan MacLean, *University of New Hampshire*

Error Assessment and Target Accuracy of a Multi-Spectral Imaging Sensor Onboard the International Space Station (ISS)
Jaganathan Ranganathan, *University of North Dakota*

Positional Accuracy of the National Hydrography Dataset
Jeff Simley, *U.S. Geological Survey*

A Monte Carlo Simulation Approach for Examining the Effect of Land Cover Map Uncertainty on Derived Grizzly Bear Habitat Models
Tracy Timmins, *University of Calgary*, Canada

* Co-authors will be listed in the final program

Special Session: Next Steps for Undergraduate and Graduate Students

Sponsored by the ASPRS Student Advisory Council
Moderator: TBD

This session addresses opportunities for undergraduate and graduate students leading up to and following graduation. Topics to be covered include: Working with your Academic Advisor, Continuing Your Education or Entering the Job Market, What You Can Really Do With Your Degree, among others.

Surface Models #2

Moderator: Bingcai Zhang, *BAE Systems*

Surface Extraction for Aerial Frame Images Based on Semi-Global Matching
Stephan Gehrke, *North West Geomatics*, Canada

Wide-baseline Mapping of Martian Craters: A Comparison Study at Santa Maria Crater
Rongxing Li, *The Ohio State University*

Converging Photogrammetry and Surveying — Making 3D Measurements from Terrestrial Lidar Point Clouds and Images
Bingcai Zhang, *BAE Systems*

Image Enhancement

Moderator: Douglas Stow, *San Diego State University*

A Super-resolution Mapping Method using Local Indicator Variograms
Huiran Jin, *State University of New York - ESF*

Detecting Human Activities in the Arctic Ocean by Constructing and Analyzing Super-resolution Images from MODIS Data
Yingli Tian, *The City College of New York*

Special Session: Digital Camera Manufacturers – New and Advanced Technologies

Sponsored by the ASPRS Primary Data Acquisition Division
Moderator: TBD

Special Session: ERDAS & DigitalGlobe 2011 8-Band Research Challenge

The DigitalGlobe & ERDAS' 8-Band Research Challenge was designed to uncover the unique benefits that 8-Band Imagery and ERDAS IMAGINE can bring to remote sensing scientists, and the greater community. Scientists from around the world participated in the challenge, conducting independent research using ERDAS IMAGINE & DigitalGlobe's unique high-resolution 8-band multispectral imagery. Their results highlight the quality of 8-Band Imagery and the power of ERDAS IMAGINE, and the limitless potential for practical applications. Our winners will be presenting their findings during this time.

BEVERAGE BREAK — 3:00 PM TO 3:30 PM

Take a break! Use this time to visit with the Exhibitors and grab a beverage in the exhibit hall. All attendees are welcome, complimentary beverages provided.

TECHNICAL SESSIONS — 3:30 PM TO 5:00 PM

Natural Disasters #1

Moderator: Nathan Jennings, *City of Sacramento*

Key Scientific Issues of Present Day Disaster Management Scenario
Orhan Altan, *Technical University of Istanbul*, Turkey

Climate Constraints and Productivity of Terrestrial Ecosystems in the Southeastern United States
Sergio Bernardes, *Center for Remote Sensing and Mapping Science-UGA*

Evaluation of Tsunami Disaster by the 2012 off the Pacific Coast of Tohoku Earthquake in Japan by using Time Series Satellite Images with Multi Resolution
Hideki Hashiba, *Nihon University*, Japan

Collaborative Emergency Operations using Geospatial Information
Nathan Jennings, *City of Sacramento*

Is Image Fusion Necessary? Investigating the Effectiveness of Fusion on Image Segmentation in the Object-based Image Analysis Framework
Chandi Witharana, *University of Connecticut*

Urban Mapping #2

Moderator: Jennifer Jensen, *Texas State University-San Marcos*

Automatic 3D Building Model Generation from Lidar and Image Data using a Hybrid Approach
Eunju Kwak, *University of Calgary*, Canada

Determining Trends in Impervious Cover for the Mobile Bay, Al Region for 1974-2008, Based on a Landsat Time Series
Joseph Spruce, *Computer Sciences Corporation/NASA Stennis Space Center*

High Resolution Mapping of Canopy Fuels in the Wildland Urban Interface: A Case Study In Austin, Texas
Jennifer Jensen, *Texas State University - San Marcos*

* Co-authors will be listed in the final program

Vegetation Mapping #2
Moderator: Zachary Bortolot, *James Madison University*

Sensor Intercomparison for the Estimation of LAI in Loblolly Pine Stands
Christine Blinn, *Virginia Tech*

Estimating Forest Properties using Ground-based Stereo Photography
Zachary Bortolot, *James Madison University*

Integration is Modernization: Incorporating Data from Several Remotely Sensed Platforms to Accurately Map Current and Potential Wetlands
Jennifer Corcoran, *University of Minnesota*

Orthorectify Historical Aerial Photographs Using RFM
Ruijin Ma, *University of Redlands*

Gaussian Bayesian Network Modeling to Improve Spatial Growth Estimates of Heterogeneous Forests
Yaseen Mustafa, *Twente University*, Netherlands

Mobile Mapping #2
Moderator: Eugene Levin, *Michigan Technological University*

IH 30 Combining New and Existing Technology to Provide A Comprehensive Solution
Eric Andelin, *Woolpert, Inc.*

Location Privacy in the U.S. — Where We Have Come From, Where We Are, and Where We Should Go
Rick Crowsey, *Crowsey Incorporated/University of Southern Mississippi*

Calibration of Photogrammetric Mobile Mapping Systems using Prior Information on the Relative Orientation Parameters among the Cameras
Ana Paula Kersting, *University of Calgary*, Canada

Cognitive Human-computer Interactions Approach to Support Visual Analytics in Multi-dimensional Environments
Eugene Levin, *Michigan Technological University*

Simulating the Apollo 14 Astronaut Traverse using LASOIS: Results of Latest Field Experiment at Haleakala National Park, Hawaii
Rongxing Li, *The Ohio State University*

Accuracy/Error Assessment #4: Definitions
Moderator: TBD

RPC Uncertainty Parameters: Generation, Application, and Effects
John Dolloff, *National Geospatial-Intelligence Agency*

Uncertainty Analysis for Data Conflation
Peter Doucette, *National Geospatial-Intelligence Agency*

Ground Truth Precision to Support Spatial Testing: How Good is Good Enough?
John Marshall, *National Geospatial-Intelligence Agency*

Accuracy Assessment, "The Emperor's New Clothes," and Other Fairy Tales
Kenneth Stumpf, *Geographic Resource Solutions*

Special Session: Preparing Competitive Grant Proposals
Moderator: Kunwar Singh, *University of North Carolina, Charlotte*
Sponsored by the ASPRS Student Advisory Council

This session will provide graduate students with relevant information on organizing and preparing a successful grant proposal. Topics covered will include finding prospective grants, developing a general proposal, securing letters of reference and the formal application process. A panel of experts will provide advice and insight from their professional grant writing experiences.

Panelists:
Marguerite Madden, *UGA*

Calibration/Registration
Moderator: Dean Merchant, *The Ohio State University*

Automatic Tie Point Registration and Adjustment of Oblique Imagery
Riadh Munjy, *California State University - Fresno*

Integration of Surveillance Video Images and 3D Models for Object Tracking
Ravi Persad, *York University*, Canada

Crossroad Method of Camera Calibration with Results
Dean Merchant, *The Ohio State University*

Assessments of Nonlinear Least Squares Methods for UAV Vision Based Navigation (VBN)
Bassem Sheta, *University of Calgary*, Canada

Image Fusion
Moderator: Sebastien Leprince, *California Institute of Technology*

COSI-Corr: A Versatile Technique to Monitor and Quantify Surface Deformation in Space and Time
Sebastien Leprince, *California Institute of Technology*

An inter-sensor Calibration and Atmospheric Correction System for Long-term AVHRR HRPT Data Files
Lihong Su, *Texas A&M University-Corpus Christi*

Information Extraction using Optical and Radar Remote Sensing Data Fusion
Gintautas Palubinskas, *German Aerospace Center DLR*, Germany

Special Session: ASPRS Ten Year Forecast
Moderator: Charles Mondello, *Pictometry*
Sponsored by the ASPRS Primary Data Acquisition Division

* Co-authors will be listed in the final program

Zoom! Zoom!

Take a ride through history at the California Automobile Museum.

Just for you, the attendees of the ASPRS 2012 Annual Conference, on Thursday evening, March 22nd, ASPRS has arranged an exclusive evening at the California Automobile Museum. Located adjacent to Old Sacramento, only three miles from the Conference host hotel, the California Automobile Museum will take you on a ride of a lifetime.

The California Automobile Museum provides a history tour on wheels. More than 150 vehicles are on display, many of them privately owned, and range from the earliest models of the 20th century to prototypes of alternative energy for the 21st century. There are cars - and memories - for anyone who appreciates every decade in between, from the Model T and tailfins to the Brass Era or the speed of racing.

Refreshments will be served throughout the evening and throughout the museum. Each ticket holder will receive one complimentary beverage.

Continuous complimentary bus transportation will be provided between the California Automobile Museum and the Sacramento Convention Center from 6:00 pm to 9:30 pm on Thursday, March 22nd.

The evening at the California Automobile Museum is included in the registration fee for those paying the Full Registration rate (Students not included). All others, including children, wishing to attend this event must purchase tickets in advance by using the registration form found on page 45-46 of this program, or at the ASPRS Registration Desk in the Sacramento Convention Center no later than 10 am on Wednesday, March 21st. Tickets will not be sold at the door. All children attending the event must be accompanied by an adult.

Friday, March 23rd

Registration Desk Open
7:00 am to 11:00 am

ASPRS Board of Directors Meeting
8:00 am to 5:00 pm

Exhibit Hall and Breakfast with Exhibitors

Exhibit Hall Open
8:00 am to 11:00 am

Breakfast with Exhibitors
8:30 am to 9:00 am

A special continental breakfast, open to all conference attendees, will be held on Friday, March 23rd in the Exhibit Hall from 8:30 am to 9:00 am. Before the Technical Sessions begin, take some time to leisurely view the exhibit hall and continue discussions with the exhibitors. Be sure to include this event on your calendar!

Technical Sessions — 9:00 am to 10:30 am

Airborne and Terrestrial Lidar #4
Moderator: Robert Pack, *Utah State University*

Segmentation of Multisource Laser Scanning Data
Mohannad Al-Durgham, *University of Toronto*, Canada

A Locally Adaptive Spatial Interpolation Technique for the Generation of High-Resolution DEMs
Deepananthan Dhanasekaran, *The Ohio State University*

Heavy Terrain Mapping for a Light Rail Transit System
Rob Merry, *Aero-Metric, Inc.*

Lidar Assisted Stereo Imaging Techniques
Robert Pack, *Utah State University*

Natural Disasters #2
Moderator: Douglas Olsen, *University North Dakota*

Near Real-time Detection of Moving Terrestrial Objects using High Temporal Resolution Frame Imagery
Lloyd Coulter, *San Diego State University*

A Multi-temporal AVIRIS Image Processing Framework for Rapidly Identifying the Influence of Oil Spill on Sensitive Estuarine Vegetation
Rodrigo Nobrega, *Geosystems Research Institute, Mississippi State University*

Multi-spectral Imaging from the International Space Station for Rapid-Response and Natural Disaster Applications
Douglas Olsen, *University North Dakota*

A GIS and Remote Sensing Based Approach to Hazard Analysis and Disaster Preparedness in the Fairbanks North Star Borough, Alaska
Kate Schaefer, *University of Alaska – Fairbanks*

Web Based Rapid Mapping of Disaster Areas using Satellite Images, Web Processing Service, Web Mapping Service, Frequency Based Change Detection Algorithm and J-iView
Joel Bandibas, *Geological Survey of Japan, AIST*, Japan

Agriculture #1
Moderator: Claire Boryan, *USDA National Agricultural Statistics Service*

A New Land Cover Classification Based Stratification Method for Area Sampling Frame Construction
Claire Boryan, *USDA National Agricultural Statistics Service*

Improving Biomass Estimation in Agricultural Areas using Combined Hyperspectral Techniques
Michael Marshall, *U.S. Geological Survey*

Red Edge First Derivative Technique as an Indicator of Co2 Leaks in Maize Canopy
Sani Yahaya, *University of Nottingham*, United Kingdom,

Extending Canopy Light Interception Measurements of Mule Light Bar over Entire Orchards using Airborne and Satellite Spectral Indexes
Jose Zarate-Valdez, *Centro Regional Universitario del Noroeste, Universidad Autonoma Chapingo*, Mexico

Land Cover/Land Use #1
Moderator: Charles Emerson, *Western Michigan University*

An Artificial Neural Network Approach to Locating Eocene Mammalian Fossils
Charles Emerson, *Western Michigan University*

A Comparison of Land-use and Land-cover Classification Methods in the Brazilian Amazon
Dengsheng Lu, *Indiana University*

Spatial and Temporal Assessment of Cumulative Disturbance Impacts on Land Condition of a Military Installation
Guangxing Wang, *Southern Illinois University - Carbondale*

Civil War Aberrations to Urban Land Use/Land Cover Changes in Sierra Leone: A Dense Time Stack Satellite Remote Sensing and Data Mining Approach
Cyril Wilson, *University of Wisconsin - Eau Claire*

A Rangeland Phenological Prediction Model for the Geographically Diverse Upper Colorado River Basin
Yuan Zhang, *University of Utah*

* Co-authors will be listed in the final program

Feature Extraction #1
Moderator: Josh Nolting, *GeoEye*

Monitoring the Appearance of Cracks in Concrete Beams via Stereo Photogrammetry
Ivan Detchev, *University of Calgary*, Canada

Detecting Individual Fish in Video Imagery under Varying Stream Conditions Using Image Processing Tools
Yuki Hamada, *Argonne National Laboratory*

On Evaluating the Quality of Automated and Semi-automated Linear Feature Extraction and Update Tools
Josh Nolting, *GeoEye*

3D Riverbank Extraction for Riparian Zone Management using Lidar Data and Aerial Photographs
Yunjae Choung, *U&GIT Co. Ltd.* and *The Ohio State University*, Republic of Korea

Accuracy / Error Assessment #5: Lidar
Moderator: David Alvarez, *Fluor-B&W Portsmouth LLC*

A User Determined Total Uncertainty Budget Model towards a Systematic and Comprehensive Client-side Control and Analysis of Laser Sensed Data
Patrick Adda, *University of New Brunswick*, Canada

Accuracy Assessment of Lidar-derived DEM
XiaoHang Liu, *San Francisco State University*

Data Life Cycle Approaches to Lidar Data Verification
Charles O'Hara, *Spatial Information Solutions, Inc.*

Accuracy Assessment of Geo-referencing Methodologies for Terrestrial Laser Scan Surveys
Keith Williams, *Oregon State University*

Geology/Archaeology
Moderator: Brian Curtiss, *ASD Inc.*

Applications of Remote Sensing and Reflectance Spectroscopy in Mining
Brian Curtiss, *ASD Inc.*

Acquiring Information for Landscape Archaeology within the Fragile Crescent Project Framework
Nikolaos Galiatsatos, *Durham University*, UK

Landslide Zoning in Fasham Area of Tehran Province (Iran)
Shadi Khoshdoni Farahani, *University Technology Malaysia*, Malaysia

Mineral Identification through Advanced Spectral Analysis Technique Utilizing Landsat ETM+ Imagery
Amit K. Bhattacharya, *Indian Institute of Technology, Kharagpur*, India

Hydrology and Water Quality #1
Moderator: Randy Hamilton, *RedCastle Resources/USDA Forest Service*

A Comparison of Groundwater Storage using Grace Data, Groundwater Levels, and A Hydrological Model In California's Central Valley
Amber Jean Kuss, *NASA Ames DEVELOP Program*

Integrating Landsat 7 Imagery with Physics-based Models for Quantitative Mapping of Coastal Waters near a River Discharge
Nima Pahlevan, *Rochester Institute of Technology*

Assessing Water Clarity in Lakes throughout Utah using Landsat Imagery
Randy Hamilton, *RedCastle Resources/USDA Forest Service*

Assessing Spatio-temporal Variation in CDOM Absorption in the Western Basin of Lake Erie
Janet Traub, *University of Toledo*

Beverage Break — 10:30 am to 11:00 am

Take a break! Use this time to visit with the Exhibitors and grab a beverage in the exhibit hall. All attendees are welcome, complimentary beverages provided.

Technical Sessions — 11:00 am - 12:30 pm

Airborne and Terrestrial Lidar #5
Moderator: Tarig Ali, *American University of Sharjah*, UAE

Continuous Modeling of Cityscapes from Multi-Sensor Data Using 3D GMDL
Jaewook Jung, *York University*

Classifier Fusion for Power-line Scene Classification
Heungsik Brian Kim, *York University*

Classification of Terrestrial Laser Scanning Data Based on Dominant Line Detection
Chao Luo, *York University*

Development of a Lidar Compression Method Based on Plane Fitting
Ruijin Ma , *American University of Sharjah*, United Arab Emirates

Natural Disasters #3
Moderator: James Lein, *Ohio University*

Measuring Earthquake and Volcanic Deformation using Correlation of Spy Satellite Images
Sebastine Laprince, *Caltech*

Imagery for Identifying and Quantifying Earthquake Surface Rupture
Kenneth Hudnut, *U.S. Geological Survey*

Applying Image-based Anomaly Detection Methodologies for Environmental Remediation Assessment
James Lein, *Ohio University*

Assessment of Fire Behavior Simulation Models in Mediterranean Climates: An Examination of FARSITE and HFire
Nicole Simons, *San Diego State University*

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* Co-authors will be listed in the final program

Agriculture #2

Moderator: Michael L. Whiting, *CSTARS, Dept. Land, Air, Water Resources, UC Davis*

Extraction of Agricultural Land in Virginia Counties through the use of High-resolution Land Cover Classifications and Cadastral Plots
Ioannis Kokkinidis, *Virginia Tech*

Integrating NASA Satellite Data into USDA World Agricultural Outlook Board Decision Making Environment to Improve Agricultural Estimates
William Teng, *Wyle Information Systems*

A Holistic View of Global Croplands and Their Water Use for Ensuring Global Food Security in the 21st Century through Advanced Remote Sensing and Non-remote Sensing Approaches
Prasad Thenkabail, *U.S. Geological Survey*

Early Prediction of Almond Yield using Weather and Landsat Data Time Series
Michael L. Whiting, *University of California - Davis*

Evaluation of SMAP Soil Moisture Data Products for Cropland Soil Moisture Monitoring
Zhengwei Yang, *USDA/NASS*

Land Cover/Land Use #2

Moderator: Bahram Salehi, *University of New Brunswick*, Canada

Analysis of the Relationship between Land Surface Temperature and Indexes with an Artificial Neural Network
Yitong Jiang, *Indiana State University*

Replacing Degraded Spectral Information with Context-based Knowledge: A Case Study on Impervious Surface Detection
Giorgos Mountrakis, *State University of New York - ESF*

The Effect of Four New Multispectral Bands of Worldview2 on Improving Urban Land Cover Classification
Bahram Salehi, *University of New Brunswick*, Canada

TerEDyn: The Terrestrial Ecosystem Dynamics Mission — A Smallsat Concept To Acquire Frequent Global 30m multispectral Imagery
Darrel L. Williams, *Global Science & Technology, Inc.*

Feature Extraction #2

Moderator: Yuanming Shu, *University of Waterloo*, Canada

Review of the Different Methods of Moving Object Extraction from a Live Video
Sina Adham Khiabani, *University of New Brunswick*, Canada

Accuracy Assessment and Improvement in the Background Subtraction Method of Live Object Extraction
Sina Adham Khiabani, *University of New Brunswick*, Canada

Land Surface Temperature Simulation in an Urban Environment
Hua Liu, *Old Dominion University*

SAR Image Segmentation using a Novel Markov Random Field Model with Label Cost Prior
Yuanming Shu, *University of Waterloo*, Canada

* Co-authors will be listed in the final program

Special Session: Models and Tools for Advanced 3D Visualization

Moderator: Barry Bitters, *Science Applications International Corporation*
Sponsored by the ASPRS Remote Sensing Applications Division

An Extensible Platform for High-Performance Geospatial Modeling
John Fisher, *ERDAS*

Real-time 3D-Stereoscopic Visualization of Geospatial Data
Barry Bitters, *Science Applications International Corporation*

Towards Dynamic Virtual 3D World: Bringing Dynamics into Integrated 3D Indoor and Outdoor Virtual World
Gunho Sohn, *York University*, Canada

3D Volume Representation for Geospatial Data in Voxel Models
Franklin Tanner, *National Geospatial Intelligence Agency*

Geospatial Modeling with Instantaneous Visualization and Feedback
Makhan Virdi, *ERDAS*

Hydrology and Water Quality #2

Moderator: Larry Fox, *Humboldt State University*

Integrating a Radiative Transfer Model and Non-parametric Classifiers to Discriminate Submerged Aquatic Vegetation in Airborne Hyperspectral Imagery of a Blackwater River
Roshan Pande-Chhetri, *University of Florida*

Data Assimilation for Estimating River Bathymetry from Upcoming SWOT Mission
Yeosang Yoon, *The Ohio State University*

The Accuracy Evaluation of Smartphone-based Technique for Coastal Monitoring
Jinsoo Kim, *ZEN21*

Comparison of Reflectance Based and Energy-balance Retrieval of Crop Evapotranspiration
Lee Johnson, *California State Univ., Monterey Bay*

Ground-level High Spatial Resolution Hyperspectral Imaging for Weed Detection
Ittai Herrmann, *The Remote Sensing Lab.*, Israel

Digital Soil Mapping using Fine Resolution DEM and SPOT Images
Que Ren, *University of Waterloo*

Use of Lidar and Color Infrared Imagery to Measure Forest Characteristics in the William B. Bankhead Forest, Alabama
Wubishet Tadesse, *Alabama A&M University*

Accuracy Assessment for Lidar-derived Elevations within a Dense, Low-height Species of Vegetation in a Semiarid Landscape
Nancy Glenn, *Idaho State University*

Light Detection and Ranging (Lidar): What We Can and Cannot See in the Forest for the Trees
Curtis Edson, *United States Military Academy/ US Army*

Massive Lidar Data Virtualization Processing in Cloud Computing Environments
Haiyan Guan, *University of Waterloo*

Generation of a New Greenland Ice Sheet Digital Elevation Model
Sudhagar Nagarajan, *University at Buffalo*

Crowd Volume Estimation using Photogrammetric Techniques
Hussein Attya, *University of Calgary*

The Disappearing Outer Banks of North Carolina
William Robertson, *Tetra Tech*

Impact of Climate Change on Plant Phenology in the Riparian area of an Perennial Desert River
Uyen Nguyen, *University of Arizona*

Evaluating and Mapping Urban Forest in the Interest of Carbon and Energy Conservation
Qingfu Xiao, *University of California Davis*

Synthesizing Multiple Data Collection Methods for California Rapid Assessment Method (CRAM) for Vernal Pool Wetlands
Erik Keethe, *ECORP Consulting Inc.*

Estimation of Forest Biomass Based on Segmentation using Airborne Lidar Data
Yongmin Kim, *Seoul National University*, Korea

Biomass Estimation by ALOS-PALSAR Images Using Wavelet Transform In Natural Forest Area
Nafiseh Ghasemi, *KNT University of Technology*

Remote Sensing Analysis of West African Mangrove Forests
Evan Johnson, *University of California, Los Angeles*

Use of Integrated MASTER Multispectral Imagery and Lidar DEM for Active Fault Detection and Evaluation
Florante Perez, *California Geological Survey*

A Multistage Approach for Detecting and Correcting Shadows in Quickbird Imagery
Jindong Wu, *California State University, Fullerton*

Monitoring Nitrate levels in Nodaway County, Missouri
Ming-Chih Hung, *Northwest Missouri State Univ.*

Measuring Sediment Concentrations in the Maumee River with Satellite Images
Colleen Nagel, *University of Toledo*

Utility of Radiative Transfer Codes in Estimation of Marine Water Constituents from Hyperspectral Data
Sima Bagheri, *NJ Institute of Technology*

Color Constancy of Outdoor Image Sequence
Heewon Lee, *The Ohio State University*

Investigating Available Woody Plant Biomass on Rangelands with Multispectral Remote Sensing
Shruthi Srinivasan, *Texas A&M University*

Modelling of Spatio-temporal Dynamics of Land Use and Land Cover using Multi-temporal Satellite Images and GIS
Md. Surabuddin Mondal, *Indian Institute of Technology*, India

A Geospatial Suitability Model for Drought-tolerant Switchgrass
Sarah Lewis, *UC Berkeley*

Development of a Smartphone Application for Environmental Monitoring
Seongkyu Lee, *Pukyung National University*

3-D Mapping Techniques using a Stereo Boom on Low-flying Aerial Vehicles
Peter Fanto, *Virginia Tech*

Unsupervised Extraction and Classification of Homogenous Objects for Hyperspectral Data Based on Integrated Feature Distributions
Xiangbing Kong, *Wuhan University*

Rapid Dissemination of Geospatial Data During an Emergency Oil Spill Response
Judd Muskat, *California Dept. of Fish and Game*

Lidar Surveying on Okefenokee Swamp: Issues and Challenges
Jeong Seong, *University of West Georgia*

ALOS/AVNIR2 Band Reflectance Characteristics of Buildings In Land Use Zones: A Case Study of Nagoya City
Yoshiyuki Yamamoto, *Aichi Institute of Tech.*

Comparison Between Different Pixel-base Classification Methods Over Urban Area using Very High Resolution Data
Ebrahim Taherzadeh, *Inst. of Advanced Tech. (ITMA)*

Interactive Exploration and Data Fusion of Multimodal Remote Sensing Data
Nancy Glenn, *Idaho State University*

Application of Geospatial Data to Wildlife Biodiversity Forecasts with Changing Land Use
Beth Stein, *Virginia Tech*

Optimal Pixel Size and Ground Resolution for Image Matching
Tamas Jancso, *University of West Hungary, Hungary*

Improving Post-Hurricane Katrina Forest Management with MODIS Time Series Products
Joseph Spruce, *Computer Science Corporation*

Eastern North Dakota Breeding Bird Survey: Land Cover Change Analysis 1992 - 2006
Tetiana Nemitchenko, *University of North Dakota*

Vegetation response to climate at treeline in the Sangre de Cristo Mountains
Shelby Young, *University of Missouri-Columbia*

Determining Trends in Impervious Cover for the Mobile Bay, Al Region for 1974-2008, Based on a Landsat Time Series
Joseph Spruce, *NASA*

* Co-authors will be listed in the final program

HOTEL/TRAVEL INFORMATION

Hyatt Regency Sacramento
1209 L Street, Sacramento, CA 95814 USA
Reservations 1 800-233-1234 • Hotel Direct (916) 443-1234

The **Hyatt Regency Sacramento Hotel** is the headquarters hotel for the **ASPRS 2012 Annual Conference** in Sacramento, California. All Conference presentations and the Exhibit Hall will be held at the Sacramento Convention Center, directly adjacent to the Hyatt Regency Sacramento.

The hotel is located in the heart of the Capitol city of California and approximately eleven miles from the Sacramento International Airport. The history and charm of northern California surround and welcome all guests in Sacramento. The hotel is situated directly across from the State Capitol building in downtown Sacramento and is surrounded by restaurants, shops, beautiful park gardens, museums and historical landmarks.

This AAA Four Diamond property offers stylish guest rooms, three on-property dining establishments, exercise room, heated outdoor swimming pool and spa, and business center. The dining establishments aim to meet a variety of tastes from an award winning buffet breakfast at Vines Café to a pool-side lunch, sports bar and an evening establishment steakhouse.

ASPRS has arranged a special Conference rate at the Hyatt Regency Sacramento Hotel of only $175 single/double occupancy
(plus applicable taxes)

A limited number of government rate rooms have been reserved and are available at the prevailing government rate. Appropriate identification will be required at check-in.

Reservations:
May be made through the link at the ASPRS 2012 Annual Conference web page: www.asprs.org/Annual-Conferences/Hotel-Travel

If you are making phone reservations, be sure to identify yourself as attending the ASPRS 2012 Annual Conference.

Early reservations are strongly advised since we have a very limited number of rooms available at the Conference rate. **Reservations must be made no later than February 16, 2012 to take advantage of the specialty room rate.**

In the unlikely event of cancellation of this entire Conference by ASPRS, ASPRS will refund 100% of all Conference registration fees paid. ASPRS assumes no liability for any penalty fees on transportation tickets, deposits for hotel accommodations or any other fees, charges, penalties or incidental costs that a registrant might incur as a consequence of the Conference cancellation.

ASPRS regrets that children 13 years of age and younger are not permitted at any time in the Exhibit Hall or any session due to safety and insurance regulations.

ASPRS thanks you for staying at the Hyatt Regency Sacramento Hotel!

ASPRS is obligated to fill a certain number of hotel rooms at our conference hotels. If we fail to meet this obligation, we pay a hefty penalty at the end of the conference, which means we will have to raise our future conference registration fees.

If you make a hotel reservation, please be certain that you plan to occupy the room. In many cases, conference attendee find that the hotel is sold out well in advance because reservations are made and then cancelled at the last minute by those who reserved early with only a slight chance of attending. Please help us avoid this problem.

FREQUENTLY ASKED QUESTIONS

How do I register for the conference?
Please register on-line or by using the registration form in this Program on page 45-46. The form may be duplicated as needed. Complete the form (type, print clearly, or attach a business card). Your name badge will reflect this information. Payment in U.S. Dollars will be accepted by Visa, MasterCard, Discover, American Express, checks made payable to ASPRS 2012 Annual Conference, and signed government purchase orders or training orders. Registrations received without payment will not be processed. Please do not mail your registration form after you have registered by fax or online.

Online:
www.asprs.org/Annual-Conferences/Sacramento-2012
(Visa, MasterCard, Discover, or American Express)

Mail To:
ASPRS 2012 Annual Conference Registration
5410 Grosvenor Lane, Suite 210
Bethesda, MD 20814
Phone: 301-493-0290 x109
All Forms of Payment

Fax To:
ASPRS 2012 Annual Conference Registration
301-493-0208 (fax)
(Visa, MasterCard, Discover, American Express/purchase orders only)

Will I receive confirmation of my registration?
Your registration will be confirmed by e-mail. A registration is not considered complete until all registration fees are received by the Meeting Registrar. Please notify the Meeting Registrar at 301-493-0290 x109 if you have not received your confirmation within two weeks of submitting your registration, or if you have any questions. Your registration packet will be available at the ASPRS 2012 Annual Conference Registration Desk, in the Sacramento Convention Center, during the registration hours noted on page 44 of this program.

What is the cancellation/refund policy?
To qualify for a full refund, a written cancellation must be received by the ASPRS 2012 Annual Conference Meeting Registrar by February 17, 2012. For cancellations received by March 2, 2012, a 50 percent refund will apply. No refunds will be made after March 2, 2012. This policy applies to all fees paid for the conference. All refunds are subject to a $50.00 processing fee and will be issued one month after the conference concludes.

Cancellations for medical emergencies after March 2, 2012, will be considered on an individual basis and will require a physician's signed letter.

What is the location of the Conference?
All ASPRS sponsored Conference activities will be held in the
Sacramento Convention Center, 1030 15th Street, Sacramento, CA, USA.

What is the Moderator's Registration Policy?
All Moderators are REQUIRED TO PRE-REGISTER at the appropriate registration rate. Moderators registered at the Full Registration Rate who attend the conference and fulfill all requirements as directed by the Conference Coordinator including submitting the required Presenters' Attendance Form immediately after their session(s) will be eligible for the appropriate rebate. This rebate will be issued within 30 business days after the conference. There are no rebates for Presenter Daily, Moderator Daily or Student registrants.

When must Technical Paper and Poster Presenters register?
For a paper/poster presenter's name and paper title to appear in the final conference program, their registration must be received within 60 days of their receiving notification of the paper/poster acceptance.

As a student, presenting either a Technical Paper or Poster, what registration fee do I pay?
All students attending the conference, whether they are presenting a paper or poster or not, are eligible for the student registration fee.

I am a part-time student at an accredited institution. Do I qualify for student registration fee?
Anyone who is currently enrolled as a full or part-time student at an accredited college or university may register at the student registration rates if they have not previously held an ASPRS membership in another category, e.g. someone who previously held full membership then returned to college cannot now register as a student. As a non-member student, you register online or use the paper form. ALL students' are required to fax a copy of your student identification to qualify for the student registration fee.

Must I pre-register for the conference?
No. On-site Registration will be located in the Sacramento Convention Center. However, a deep discount is available to everyone registering at least 30 days prior to the conference start date.

Are Daily Registrations permitted for all categories?
Yes. Daily registrations may be done in advance or on-site. However, a deep discount is available to those who register at least 30 days prior to the conference start date.

Is there a charge for the User Group Meetings?
No, the User Group Meetings are free of charge, however some require advanced reservations. See page 45-46 of this program for details.

May I bring a Guest to the conference?
Yes, we welcome adult guests. This is a professional conference and children under age 13 are not permitted to attend any sessions or visit the Exhibit Hall. A separate registration fee has been set for all guests. (Please see Registration Form on page 45-46 of this program). This fee includes the admission to the Exhibit Hall, and the Exhibitors' Reception. Admission to the general and technical sessions is not included with this registration. If guests wish to attend any of these sessions, they must register at the appropriate rate.

Is there an additional charge for the Social Events?
If you are registered with a Full Registration, the Exhibitors' Reception, and the California Automobile Museum are included in the registration (see chart on page 45 of this program). All student, daily and child registrants must purchase tickets if they wish to attend the California Automobile Museum social event. The ticket cost for children under 13 is $35 each. Children over 13 years of age must purchase an adult ticket. All tickets must be purchased in advance no later than 10 am on Wednesday, March 21, 2012.

I am not a US citizen and am coming from outside the United States, how do I get a Letter of Invitation to obtain a visa?
You must first register for the conference following the procedures

outlined above and pay the appropriate registration fee. Within the online registration form you will have an option to request a Letter of Invitation. If you prefer, you may submit a written request for a Letter of Invitation to:

Mrs. Sokhan Hing
ASPRS Membership Manager
5410 Grosvenor Lane, Suite 210
Bethesda, MD, 20814 USA
sokhanh@asprs.org

How do I get into the Exhibit Hall if I am not registered for the conference?
Daily Exhibit Hall badges may be purchased at the Conference Registration Desk in the Sacramento Convention Center. Everyone entering the Exhibit Hall must have a name badge, including children 13 years of age and older. Children under 13 years of age are not permitted in the Exhibit Hall at any time due to insurance and safety regulations.

Are Workshops included with the registration fees?
No. Workshops require individual registration and a separate fee in addition to the general conference registration fees. Availability is based on space. We do not reserve spaces without full payment in advance and there is no waiting list. Workshop registrations must be received by February 17, 2012. ASPRS reserves the right to cancel any workshop if the minimum number of registrations is not received by February 17, 2012. On-site registration will be available for confirmed workshops with available space. Register early as many workshops will sell out prior to February 17, 2012.

As a Technical Paper or Poster Presenter, whose presentation has been accepted, when do I submit my work to be included in the proceedings?
You will need to register for the conference using the methods described above and submit your complete paper or poster (not an abstract) as directed in the e-mail instructions you received previously no later than January 16, 2012.

Does ASPRS provide laptops during Technical Sessions?
No, ASPRS does not provide laptops or desktop computers for Presenters during Technical Sessions. All Presenters' must provide their own laptop computer.

What does ASPRS provided in each Technical Session room?
Each technical session room will be equipped with a LCD projector and screen. A microphone will be provided when necessary. ASPRS does NOT provide internet access, laser pointers, or laptop computers for the technical sessions.

Do Presenters have a Preparation Room?
Yes. A room will be available on a first come basis from 8 am to 5 pm March 20th through 22nd and 8 am to 12:30 pm March 23rd. This room will be equipped with an LCD projector and screen. All presenters must bring their own laptops for their presentations. The location of this room will be announced in the Final Program that will be included with the on-site registration materials. We encourage all presenters to review their materials prior to their presentation.

What are Technical Paper Presenters expected to do when they arrive?
All Technical Paper Presenters should check in at the Conference Registration Desk to pick-up their registration packets and initial the Master Final Program next to their name including either a hotel room number or cell phone number. A Master Final Program will be posted at the Conference Registration Desk so the session moderators can check if each presenter has arrived and can contact them if necessary.

What are Poster Presenters expected to do?
ASPRS provides to each Poster Presenter one side of a fabric covered poster board that measures eight feet wide by four feet high, and push pins. All Poster Presenters should plan to arrive between 7:30 am and 10 am on Tuesday, March 21st to affix their work to any available board. All posters must be removed by 12 noon on Friday, March 23rd. All poster packaging must be removed from the poster area once posters are hung. ASPRS is not responsible for posters that are not removed. Poster Presenters must also check in at the Conference Registration Desk to pick-up their registration packets and initial the Master Final Program next to their name including either a hotel room number or cell phone number.

May I volunteer to assist with the Conference activities?
Yes, if you are a student at an accredited college or university, you are welcome to apply for service as a conference volunteer. Please see full details at the Conference web page under the Presenters & Students tab.

Is Disability Assistance Available?
If you have special needs, please contact ASPRS Headquarters at 301-493-0290 ext. 106. A written statement will be required outlining your particular needs. Please submit all requests for assistance by March 17, 2012, so that appropriate arrangements can be made.

Why do I need a badge?
Your badge is verification of your paid registration and must be visible for admission to all sessions and the Exhibit Hall.

What if I forget or lose my badge?
A charge of $5 will be made for replacement of lost badges.

Why do I need tickets for certain events?
Your tickets are proof of payment for certain events and must be presented at the collection point. Lost tickets will not be replaced.

Will it be possible to post resumes and job openings?
Yes, posting boards will be provided for resumes and job openings. Please bring multiple copies of all postings to allow interested parties to take one and check the board frequently for new materials.

How do I get a copy of the CD-ROM Proceedings?
All registrants, except for those registered as Spouse/Guest, will receive a CD-ROM of the proceedings on-site with their registration materials. Additional copies can be ordered with the Conference Registration Form or purchased on-site for $20 at the ASPRS Booth in the Exhibit area.

What are the Conference Registration Desk Hours?

Sunday, March 18	4:00 pm to 7:00 pm
Monday, March 19	6:30 am to 5:00 pm
Tuesday, March 20	6:30 am to 5:00 pm
Wednesday, March 21	7:00 am to 5:45 pm
Thursday, March 22	7:00 am to 5:00 pm
Friday, March 23	7:00 am to 11:00 am

Conference Registration materials are available only during the above hours.

What are the Exhibit Hall Hours?

Wednesday, March 21	10:30 am to 7:00 pm
Exhibitors' Reception	5:30 pm to 7:00 pm
Thursday, March 22	9:00 am to 5:00 pm
Friday, March 23	8:00 am to 11:00 am

Imaging and Geospatial Technologies – Into The Future

Sacramento, California, USA • March 19-23, 2012

Register on-line at www.asprs.org/Annual-Conferences/Sacramento-2012/ or complete this form (type, print clearly, or attach a business card) and return to ASPRS 2012 Annual Conference Registration, 5410 Grosvenor Lane, Suite 210, Bethesda, MD 20814. Phone: 301-493-0290, ext. 109 (all forms of payment accepted by mail) or fax: 301-493-0208 (Visa, MasterCard, Discover, and American Express or purchase orders only).

Personal Information

Preferred first name on badge:_____   Registrant's Birth Country:_____

Name (please print):_____
First Name   M.I.   Last Name/Family Name   Suffix

Organization Name (if applicable): _____

Street Address: _____

City: _____   State/Province:_____

Zip Code/Postal Code:_____   Country: _____

Business Phone: _____   Cell Phone: _____

Business Fax: _____   Email: _____

Emergency Contact Name: _____   Emergency Contact Phone: _____
Optional

Spouse/Guest Name: _____   ❑ Please check this box if you would like the above Personal Infor-
If attending   mation updated in your ASPRS membership profile.

❑ ASPRS Member (# _____)   ❑ Non-member

Are you Currently certified by ASPRS? ❑Photogrammetrist (#_____)   ❑ Technologist (# _____)

❑ Mapping Scientist — GIS/LIS (# _____)   ❑ Mapping Scientist — Remote Sensing (# _____)

❑ Provisional Certification (# _____)

please check the appropriate boxes

Member Registration Fees

	Through February 17, 2012	After February 17, 2012
❑ **Full***	$510	$675
❑ Daily		
❑ Wednesday 3/21*	$280	$345
❑ Thursday 3/22	$220	$280
❑ Friday 3/23	$220	$280
❑ **Technical Paper/Poster Presenter/Moderator, Full***	$510	$675
❑ Technical Paper/Poster Presenter/Moderator, Daily		
❑ Wednesday 3/21*	$280	$345
❑ Thursday 3/22	$220	$280
❑ Friday 3/23	$220	$280
❑ **Student, Full***	$125	$140
❑ Student, Daily		
❑ Wednesday 3/21*	$65	$75
❑ Thursday 3/22	$50	$60
❑ Friday 3/23	$50	$60
❑ **Student Technical Paper/ Poster Presenter, Full***	$125	$140
❑ Student Technical Paper/Poster Presenter, Daily		
❑ Wednesday 3/21*	$65	$75
❑ Thursday 3/22	$50	$60
❑ Friday 3/23	$50	$60
❑ **Spouse/Guest***	$170	$170

*includes Exhibitors' Reception

Non-Member Registration Fees

	Through February 17, 2012	After February 17, 2012
❑ **Full***	$660	$800
❑ Daily		
❑ Wednesday 3/21*	$370	$420
❑ Thursday 3/22	$310	$365
❑ Friday 3/23	$310	$365
❑ **Technical Paper/Poster Presenter/Moderator, Full***	$660	$800
❑ Technical Paper/Poster Presenter/Moderator, Daily		
❑ Wednesday 3/21*	$370	$420
❑ Thursday 3/22	$310	$365
❑ Friday 3/23	$310	$365
❑ **Student, Full***	$185	$200
❑ Student, Daily		
❑ Wednesday 3/21*	$95	$105
❑ Thursday 3/22	$60	$70
❑ Friday 3/23	$60	$70
❑ **Student Technical Paper/ Poster Presenter, Full***	$185	$200
❑ Student Technical Paper/Poster Presenter, Daily		
❑ Wednesday 3/21*	$95	$105
❑ Thursday 3/22	$60	$70
❑ Friday 3/23	$60	$70
❑ **Spouse/Guest***	$170	$170

*includes Exhibitors' Reception

Exhibit Hall Only (This registration type is for entrance to the Exhibit Hall ONLY and does NOT include entrance to any of the Technical Sessions or Plenary Sessions.)

❑ Wednesday	$80	❑ Thursday	$50	❑ Friday	$50
❑ Wednesday and Thursday	$125	❑ Thursday and Friday	$90	❑ All Three Days	$150

	Full Member-Non-member	Presenter Full Member-Non-member	Student Member-Non-member	Spouse/Guest	Daily, all registration categories
General & Technical Sessions	*	*	*		*
Exhibit Hall	*	*	*	*	*
Exhibitors' Reception	*	*	*	*	
Conference Proceedings	*	*	*		*
California Automobile Museum	*	*	*	*	

$ _____
Subtotal

Workshops (not included in registration fee)

	Student**	Member	Non-Member
☐ Workshop 1 — Unmanned Aerial System (UAS) Concepts, 3/19	$125	$235	$335
☐ Workshop 2 — Image Classification Considerations for the Development of Accurate, Detailed, and Quantitative Land Cover Map Data, 3/19	$125	$235	$335
☐ Workshop 3 — Hyperspectral Image Processing and Feature Extraction: Maximizing Geospatial Information Retrieval, 3/19	$125	$235	$335
☐ Workshop 4 — Vegetation Analysis and Moisture Content Assessment in Urban Areas Using Remote Sensing Data, 3/19 morning*	$90	$180	$280
☐ Workshop 5 — Calibrating Film and Digital Sensors for Today's Geo-Spatial Business, 3/19 morning*	$90	$180	$280
☐ Workshop 6 — Principles and Practice of Synthetic Aperture Radar, 3/19 afternoon*	$90	$180	$280
☐ Workshop 7 — Digital Terrain Models – Algorithms and Mathematical Procedures, 3/19 afternoon*	$90	$180	$280
☐ Workshop 8 — Image Geometric Correction: An Extensive Approach, 3/20	$125	$235	$335
☐ Workshop 9 — Airborne GPS and Inertia in Support of Triangulation and Orientation of Airborne Framing and Push Broom Sensors, 3/20	$125	$235	$335
☐ Workshop 10 — Object Oriented Image Classification: From Feature Extraction to Land Cover Mapping, 3/20 morning*	$90	$180	$280
☐ Workshop 11 — Looking Above the Terrain: Lidar for Vegetation Assessment, 3/20 morning*	$90	$180	$280
☐ Workshop 12 — Photogrammetric Processing: Surface Model and Orthophotograph Workshop, 3/20 morning*	$90	$180	$280
☐ Workshop 13 — Developing Geographic Data Visualization Tools in an Open Source Environment, 3/20 afternoon*	$90	$180	$280
☐ Workshop 14 — Advanced Thematic Accuracy Assessment, 3/20 afternoon*	$90	$180	$280
☐ Workshop 15 — Lidar Waveform: The Potential and Benefits for Topographic Mapping, 3/20 afternoon*	$90	$180	$280

*denotes a half-day workshop.

**Students must provide a valid student ID when they register. Students will be allowed to attend workshops at the reduced price on a space available basis. All student registrations for workshops that are received before February 17, 2012, will be held until that date. If there are spaces available at that time the student will be notified that their registration has been accepted. If a student workshop registration is not accepted, their workshop fee will be refunded in full.

NOTE: Individual workshops are subject to cancellation if the minimum number of required registrations are not received by February 17, 2012.
Workshops are limited to a maximum of 40 attendees per workshop. Popular workshops sell out early and we do NOT keep a waiting list.

Social Events

California Automobile Museum

Thursday, March 22nd, 6:00 pm to 9:30 pm. Transportation from the Sacramento Convention Center will be provided.

☐ Adult Ticket   quantity _____ @ $85 each
☐ Children's* Ticket   quantity _____ @ $35 each
        *Children 13 years of age and younger

Awards Luncheon

☐ Wednesday, March 21, 2012   quantity _____ @ $55 each

Classified Session

☐ Monday, March 19, 2012   quantity _____ @ $100 each

Attendees for this session must be U.S. citizens and possess a minimum SECRET clearance to attend.

Additional Proceedings

☐ CD-ROM Proceedings   quantity _____ @ $20 each

Each Full, Student, and Daily registrant will receive one copy of the conference proceedings as part of their registration. Extra copies of the proceedings may be purchased on site.

Method of Payment (Full payment must accompany this form.)

☐ Check (make payable to ASPRS 2012 Annual Conference, print attendee name on check)
☐ Visa   ☐ MasterCard   ☐ Discover   ☐ American Express

_____
Name on Credit Card

_____
Billing address of Credit Card Holder

_____
Contact phone and email address for Credit Card Holder if other than registrant.

_____
Credit Card Account Number   Expires (Month/Year)

_____
Cardholder Signature   Date

☐ Purchase Order #_____ (government and university only)

Payments must be made in U.S. dollars drawn on a U.S. bank or appropriate credit card. Make checks payable to ASPRS 2012 Annual Conference and print attendee name on check.

$_____ $_____
Subtotal from front of form   Total amount enclosed

ASPRS is offering a special **New Member Promotion** to non-member attendees at the ASPRS 2012 Annual Conference. Your Conference registration at the Non-Member rate entitles you to a complimentary 1-year ASPRS membership. This offer applies only to those who have not been a member of ASPRS within the past three (3) years.

We are also offering a **New Student Member Promotion** to student non-members. Your ASPRS 2012 Annual Conference registration at the Student Non-Member rate entitles you to a complimentary 1-year ASPRS Student membership. This offer applies only to those who are currently enrolled as a full or part-time student at an accredited college or university and who have not previously held an ASPRS membership in another category or have not been a member of ASPRS within the past three (3) years.

Once your paid conference registration has been confirmed, we will provide you with a membership application and instructions for completing and returning it, if you choose to accept the complimentary membership. Students must provide proof of current status with their application.

To qualify for a full conference registration refund, a written cancellation must be received by the ASPRS 2012 Annual Conference Meeting Registrar at registrar@asprs.org by close of business on **February 17, 2012**. For cancellations received by close of business **March 2, 2012**, a 50 percent refund will apply. **No refunds will be made after March 2, 2012.** This policy applies to all fees paid for the conference. All refunds are subject to a $50.00 processing fee and will be issued one month after the conference concludes.

Cancellations for medical emergencies after the above deadline will be considered on an individual basis and will require a physician's signed letter.

In the unlikely event ASPRS finds it necessary to cancel this entire conference, 100 percent of the registration fees paid will be refunded. ASPRS assumes no liability for any penalty fees on transportation tickets, deposits for hotel accommodations or any other fees, charges, penalties, or other incidental costs that a registrant might incur as a consequence of this conference being canceled.

Please direct all registration related questions to the ASPRS 2012 Annual Conference Meeting Registrar at registrar@asprs.org.

Xiang Yu,
Peace Map Co., Ltd.

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